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ABSTRACT

A follow-up to a limited experiment with the use of satellites in education and public service conducted by the University of the West Indies (UWI) in 1978, this study explores the feasibility of providing a number of services, which would include an extension system based on the use of the UWI telecommunications network. The study was designed to determine the level of interest for UWI extension and other programs; existing and potential resources for the provision of such services; potential programming; types and likely costs of delivery systems; preliminary institutional groundwork that would be needed; and financial support. An introduction discusses the geographic area containing the English-speaking Caribbean territories, and describes general aspects and examples of telecommunications applications in the area, including specific applications of communications techniques in education, agriculture, and telemedicine in the various countries, and possible uses of a network by UWI. Additional topics discussed include the current status of agriculture, health, and education in the Caribbean; expenditures and demographic trends; possible telecommunications applications and available facilities; and possible telecommunications networks. Also included are reports on seminars, meetings, and demonstrations; recommendations for program options; an appendix listing steps for the establishment of an open campus; and a glossary. (LMM)

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CARIBBEAN REGIONAL COMMUNICATIONS SERVICE STUDY

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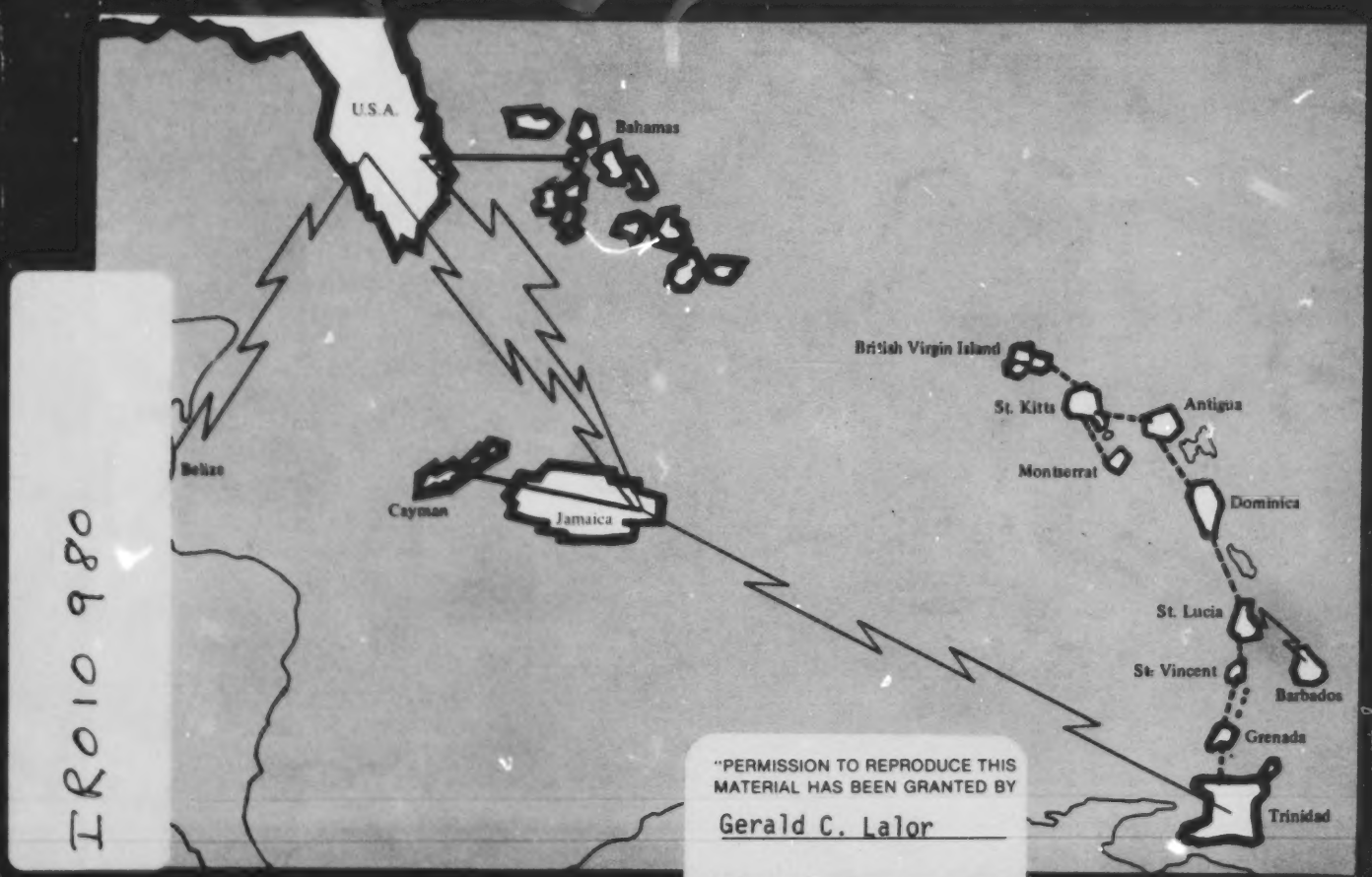

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REPORT OF
THE CARIBBEAN REGIONAL COMMUNICATIONS
SERVICES STUDY

G.C. LALOR

UNIVERSITY OF THE WEST INDIES
MONA

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PREFACE

During the period January to March 1978, the University of the West Indies experimented on the use of satellites in education and public service. The success of that limited programme led to the present follow-up study which has examined the feasibility of providing a number of services, including an Extension System based on the use of a University Telecommunications network. The study set out to determine:

1. the level of interest for extension programmes and other offerings from UWI to member nations;

2. the exisiting resources, human and material, applicable to the provision of such services;

3. the resources which could be developed to apply to an extension activity;

4. the types of programmes UWI might be interested in providing;

5. the types and likely costs of delivery systems which UWI might consider;

6. the institutional groundwork to be laid before such systems could be implemented;

7. how any future system might be supported financially.

Responses to the possible use of telecommunication in public service have been generally favourable. The levels of enthusiasm depended very much on whether the equipment and the techniques had been demonstrated, and judging particularly from the results of a demonstration of teaching by telephone in Jamaica, in retrospect, it seems a pity that more effort had not been put into the experimental work and demonstrations. Nevertheless, sufficiently definitive answers have been obtained to most of the above questions to support the recommendation for a five year pilot programme with the potential to convert into a fully operational system.

Many persons contributed to the work described in this report. The Overall project design owes much to Dr. Dennis Foote and Mr. Richard Martin. Mr. R. Murray, Dr. Marlene Cuthbert and Ms. Catherine Gilpin-Hudson were at various times full-time research staff with the project. The University Chancellor, Vice-Chancellor, other officers and staff gave enormous support as did the Honourable Charles Maynard, the Minister of Education and Health of Dominica and others. Caribbean Ministries of Education, Health and Agriculture and the telecommunications carriers also made important contributions. Many persons in the Caribbean, the U.S.A., the South Pacific, New Zealand, Australia and the United Kingdom gave freely of their time and shared their expertise willingly.

The project was assisted by a number of local and foreign consultants whose contributions we have attempted to acknowledge in the text. The co-ordination of much of the work done in the United States was carried out by the Academy for Educational Development.

The study was managed by the Office of Pro-Vice-Chancellor G.C. Lalor in consultation with US Agency for International Development, Washington, Project Manager, Richard Martin. USAID funding provided for full time employees, short term consultants as required, for the purchase of certain items of equipment and for travel, training, and acquiring and disseminating information. The typescript of this document was prepared by Miss Jennifer Edwards with the assistance of Miss Faith Patterson.

It is a pleasure to acknowledge the contributions of all these persons.

G.C. Lalor
April, 1982

GLOSSARY OF TERMS

Active bridge: A bridge that uses "active" solid state elements at each port.

Audio teleconferencing: Two-way radio communication between two or more groups (or three or more persons) who are remote from one another. sp Bandwidth: The difference in cycles per second, or hertz, between the high and low frequencies of a band. The range of frequencies present in any given signal; also the range of frequencies that can be passed by a transmission medium without undue distortion. A broadband medium can transmit frequencies in the range of about 3 million cycles (3 mHz) per second; a narrowband medium can transmit frequencies in the range of about 3,000 cycles (3 kHz) per second. sp Baud: a rate of information flow. Given in bits per second (bps), the rate is the highest number of single elements (bits) that a device is capable of transferring in one second between two devices.

Bridge: A device that links three or more telephone channels.

Broadband: See bandwidth.

Broadcast: One-way transmission of information.

Computer teleconferencing: The use of shared computer files, remote terminal equipment, and telecommunications networks to facilitate interactive group communication. Conferences may involve synchronous and/or asynchronous communications; usually a complete conference record is kept and reference made to specific entries; conferences generally have a group task orientation; often over a specific time period.

Conference calls: Dial-up, operator assisted phone calls between more than two individuals or groups.

Facsimile: Transmission of images of original documents(including both print and graphics) by electronic means, usually via telephone lines.

Four-wire circuit: A circuit using two pairs of conductors, one for the send channel and one for the receive channel.

Frequency: The rate at which a current alternates, measured in Hertz, kiloHertz, megaHertz, etc.

Full duplex: Term applied to a communication channel over which both transmission and reception are possible in two directions at the same time.

Half duplex: A term applied to a communication channel over which both transmission and recption are possible, but only in one direction at a time.

Hard copy: Data information printed on paper.

Interactive media: Refers to telecommunications channels that allow two-way exchange of information.

Interface: A boundary between two pieces of equipment across which all the signals which pass are carefully defined.

Modem: Contraction of modulator-demodulator; a device that modulates and demodulates signals transmitted over a telecommunications channel.

Narrowband: See bandwidth.

Passive bridge: A bridge that uses "passive" resistive elements, such as metallic film resistors and individual adjustments, at each port.

peripheral device: Memory storage unit, input or output device, attached to but not part of the central processing unit of a computer.

Press-to-talk microphones: A microphone that is activated by depressing a bar or button.

Slow-scan television: Refers to a system that transmit and/or receives still video pictures over narrowband telecommunications channels.

Telecommunications: Communications over distance using electronic means.

Teleconferencing: Two-way communications between two or more groups (or three or more persons) remote from one another, using electronic means.

Telecopier: See facsimile.

Telenet: A packet-switched telephone network available commercially.

Telewriter: A general term that refers to an electronic device that produces hand-drawn information that can be transmitted over a narrowband telecommunications channel.

Terminal: A device which facilitates human communication with a computer. Usually it consists of a keyboard with alphabetic and numeric characters coupled with a printing mechanism or CRT.

Transceiver: A terminal that can transmit and receive information.

Transmission line: The means by which a signal is sent and received. Transmission "line" is sometimes used to refer to a satellite or microwave link.

Transmission loss: Refers to the decrease in energy of signal power in transmission along a circuit due to resistance or impedance of the circuit or equipment.

Two-Wire circuit: A typical telephone transmission circuit; a circuit formed by two conductors insulated from each other, providing a send and receive channel in the same frequency.

Video teleconferencing: Two-way communication between two or more groups (or three or more persons) remote from one another, using a full-motion television system.

Voice grade channel: A channel suitable for the transmission of speech, digital or analog data and facsimile, generally with a frequency range of about 300 to 3,000 kiloHertz.

Voice-switched microphones: A microphone that is activated by a sound of sufficient amplitude.

Voice switching: An electrical technique for opening and closing an audio circuit in response to the presence and absence of sound.

Word processing: The application of computer technology to automate office functions. Among the capabilities of a word procesing system are electronic storage and retrieval of documents, electronic text correction and editing; and, by being linked to a telecommunications distribution system, electronic mail and text transmission (Computing Word Processor).

CHAPTER ONE

INTRODUCTION

The English speaking Caribbean territories lie on a wide arc from Belize in Central America to Trinidad just off the Venezuelan coastline and further South to Guyana. The distances are quite large; Nassau is separated from Belize City by 950 miles and from Trinidad by over 1,800 miles. Some of the islands are densely populated but some of the populations are very small; Montserrat, the Turks and Caicos Islands and the British Virgin Islands together total only about 30,000. The total population of the Region is 4.5 million with a large proportion under the age of twenty.

Per capita incomes are low, though generally above those classified as the poorest of the poor. In 1978 these varied from US$2,910 for Trinidad and Tobago down to US$320 for St. Vincent, but the figures do not give a full picture, as the cost of consumer goods for all income groups is very high. Table 1 summarises some basic information on the territories.

Table 1: Sizes, Populations and Per Capita GDP for Certain Caribbean Territories.

Territory	Area (Sq.Mls.)	Population mid 1978 (Thousand)	Per Capita GDP 1979 (US$)
Anguilla	35	7	
Antigua	171	74	1,070
Bahamas	5,380	225	2,780
Barbados	166	250	2,400
Belize	8,867	153	1,030
British Virgin Islands	59	12	1,943*
Cayman Islands	100	12	
Dominica	290	81	410
Grenada	133	97	630
Guyana	83,000	820	570
Jamaica	4,411	2,133	1,240
Montserrat	39	11	566*
St. Kitts/Nevis	103	50	780
St. Lucia	238	112	780
St. Vincent	150	96	490
Trinidad & Tobago	1,980	1,133	3,390
Turks & Caicos Islands	166	6	690*

*1975
Source: United Nations Yearbooks and World Bank Atlas 1980.

The Less Developed Territories

The Region is often divided into the More Developed Countries (MDCs) and the Less Developed Countries (LDCs). These are, of course, relative terms. The MDCs comprise the relatively better-off countries: Bahamas, Barbados, Jamaica, and Trinidad and Tobago. The

extremely small size of the populations of many territories is frequently reflected in the small scale of operations in both the public sector and in most private sector enterprises.

Despite this, essential community services such as public health, education, transportation, water, sewerage, electrification, environmental protection, etc., must be established to serve small populations, and complex systems must be managed with small recurrent budgets and with small technical and managerial staffs. The problems of scale and inadequate finances make the provision of quality public services extremely difficult and militate against planning for future growth and development needs.

Infrastructure

The infrastructure in the Region compares favourably with that of many Third World Countries. There are stable Governments; reasonably good supplies of water and electricity; road, sea and air transport; telecommunications systems, radio and in many instances television broadcasting. Health facilities; construction capability; maintenance, etc., though often far from adequate, are at least in existence and important institutions throughout the Region are being developed and strengthened. The Governments have been much concerned with the improvement of education, public utilities, transport, agriculture, the provision of industrial estates and of development financing, and generally improving the lot of the poor.

Manpower

There is a severe shortage of qualified personnel in the Caribbean Region. The percentage of the West Indian labour force with post-secondary education is very low and recruitment into the Public Service, particularly in the LDCs, is frequently done directly from the school system. The shortage of middle level technical and managerial manpower is a major constraint on Regional development. So too, is the lack of skilled and highly qualified personnel to act as leaders and innovators, to aid in the transfer of technology, and to develop appropriate technologies.

Yet, socio-economic and political pressures are placing increasing demands on both the public and private sectors throughout the Caribbean. The "standard" educational and training programmes need to be strengthened and new opportunities must be made available to help prepare individuals as they move to positions of greater responsibility and as organisations strive to adapt to the changing environment, an adaption that is made more difficult by various world trends including hyper-inflation.

Education and Regional Development

It is now generally agreed that education is one of the most vital elements in development. As the world makes more and more use, as it must, of newer technologies, education will assume an even more important role in the future than it has in the past. One of the

first priorities therefore, of any nation must be to provide the most relevant education at levels which make sense for each citizen, but of course, bearing always in mind the overall economic consequences of any particular choice.

For most territories, education, particularly higher education, remains at a premium, and less than 1 percent of the Region's labour force are University graduates. The demand for education and training, both formal and informal, continues to grow, but expansion programmes are severely constrained by restricted finances and limited manpower. Yet the needs are vital and urgent and failure to meet these brings the likelihood of dire consequences, including destruction of the fabric of the societies.

The tasks which face the Caribbean, as indeed many other countries, are so vast and so difficult that it is not easy to see how these can be tackled by conventional methods only. It therefore appears imperative to examine new technologies and new opportunities, but particularly in the light of what has gone on before and focussing on present strengths and weaknesses as well as needs.

Communications Techniques

A remarkable revolution is quietly taking place. This is based on advances in electronics and materials science which make commonplace today, capabilities which were almost unimagined twenty years ago. The effects will be pervasive but are perhaps most obvious now in the computer and communications fields.

In a period of rapidly rising costs for materials and salaries, one range of items - that based on the new electronics technologies - is consistently being produced with increasing capabilities and at reducing costs. The programmable micro-processor today available for a couple of thousand dollars out-performs the original large computers. Long distance communications, including television, are being steadily improved even while the costs are falling. It is clear that the costs of steel, brick and concrete, of replaceables, of salaries and labour, and of travel, will continue to increase and plans for solutions of the problems of education and of regional development must take this into account.

In 1978 the University of the West Indies carried out its first experiment using communications satellites. This was made possible by a grant from United States Agency for International Development (USAID) and the assistance of the National Aeronautics and Space Administration (NASA). The experiment linked the University sites in Barbados, Jamaica and St. Lucia, using outgoing audio and video signals from Jamaica, and return audio from the other sites, on a fully interactive basis. The variety of programmes conducted included administrative teleconferences, lectures and seminars. Project Satellite, as the experiment was called, was the direct forerunner of the present study which examines applications of communications technologies in a number of situations and considers how these technologies may be of service within the Caribbean Region.

The present study was partially funded by a grant from USAID which allowed for the employment of staff and consultants, the purchase of certain items of equipment, and travel within the Region for discussions and studies. Visits were also made elsewhere, particularly in North America and the South Pacific to examine at first hand various on going programmes.

CHAPTER TWO

GENERAL ASPECTS AND EXAMPLES OF TELECOMMUNICATIONS APPLICATIONS

The communications revolution "began" in October, 1957 with Sputnik I and by 1963 the first geosynchronous satellite was launched. Parked in a stable orbit about 22,300 miles above the equator, these satellites rotate at the same speed as the earth and so from the ground appear to be stationary in space; this obviates the need for an expensive tracking antenna. Many countries now operate their own domestic satellite systems and the numbers are expected to grow. The international network is controlled by the International Telecommunications Satellite Organisation (INTELSAT) which was formed in 1964.

INTELSAT's capabilities have grown rapidly. Between 1965 and 1975, the number of telephone circuits increased from 200 to 20,000 more than doubling every two years. The number of circuits is expected to double again in the period 1980 to 1984. This growth occurs not only because of a larger number of satellites but is due also to increased capabilities. INTELSAT I, first operational in 1965, has a capacity of 420 voice channels or 1 television channel. Each INTELSAT IV-A (1975) carries 6,000 voice channels, plus two television channels. INTELSAT V, (1981) has 12,000 voice channels and two television channels. The US domestic Telstar 3 to be launched in 1983 will have a capacity for 21,600 simultaneous calls.

Today a variety of satellites provide a wide range of domestic communication services to Canada and the United States including Hawaii, and Alaska and to Puerto Rico. France and Germany share SYMPHONIE. Indonesia has launched its domestic satellite which serves its widespread islands and Japan has its own system. A number of countries including Algeria, Brazil, Chile, Colombia, Egypt, India, Indonesia, Iraq, Libya, Malaysia, Nigeria, Oman, Peru, Sudan, Saudi Arabia, Uganda, Yeman, and Zaire now lease facilities from INTELSAT for their own national communications. India, Mexico and China, among others, plan early launchings.

Several Less Developed Countries are already involved in work and/or studies on the use of telecommunications in education and public service.

Advantages for Less Developed Countries

Communications and information are no less important to the LDCs than to the developed world. Here is one new technology which is transforming society in which there need be no time lag in its full application.

The principal advantage of a satellite system to most developing countries presently lies in the startling improvement in the reliability, quality and possible increase in the quantity of its

international communications. But there are other possibilities and much is to be learned from domestic applications of satellites in the developed countries.

Cost, Flexibility and Reliability

Satellites are cost insensitive to distance and allow simultaneous multi-access usage. The cost of reaching the most remote community is virtually the same as that of reaching nearby communities and the multi-access facility is ideal for educational purposes. Thus stations may be located according to specific needs and the network readily expanded as required. Satellites also allow a systems flexibility with respect to capacity that is impossible with terrestrial systems. Satellite ground stations can be installed to provide as little as a single voice channel of service using single channel per carrier (SCPC) equipment. Additional capacity can easily be added as demand develops. Other services including data transmission and radio and television reception, can be added incrementally in any particular location to the same basic ground station as demand arises. This contrasts with a terrestrial open-wire system which cannot be expanded significantly at any remote location without major cost throughout the entire system.

Satellite systems also permit a simplex circuit (one-half of a standard duplex telephone circuit) to be shared at a number of locations as a common conference circuit. This capacity is less costly than duplex cicuits inter-connecting each pair of points. Unlike terrestrial conference circuits which are technically difficult to configure, because of variations in power levels on different lines, this capability is easier to provide by satellite than by standard telephone service.

Satellite systems are likely to be more reliable, more robust and easier to maintain than terrestrial systems, an important consideration in rural areas especially in mountainous, or other difficult terrain. The space segments of satellites are highly reliable, as they must be in inaccessible locations. The ground segments, because they are located near the settlements they are intended to serve, are more accessible for maintenance and repairs than are the remote repeater sites necessary for most terrestrial communication. Because signals reach any other point in the network in a single "hop" through the satellite, reliable interconnection depends solely on the two stations involved, in contrast to the terrestial system with its series of sequential links, any one of which can disrupt the connection. These characteristics make the satellite system as a whole very robust because a failure in any ground station affects only that location. Moreover, the equipment used at the ground stations can be surprisingly simple.

Potential of New Systems

New satellite delivery systems offer tremendous potential. The eighties will see an increase in the number of satellites, an increase in transmission capacity and a decrease in the cost of receiving

stations. Satellites will be able to be placed in closer proximity to each other by the use of the Ku band (the frequency bandwidth of 11.7-12.2 GHz for uplink and 14.0 GHz for downlink). The receiving dishes will be smaller, very much cheaper, and readily located on the premises of institutions for direct reception and transmission.

Domestic Applications of Satellites

Remote and isolated communities in developed countries experience constraints in social and economic development similar to those of less developed countries. These constraints include: difficulty in attracting staff for remote areas; high cost and inefficient use of specialists for routine visits to remote areas; isolation of field personnel from specialists' advice or consultation; long delays in dealing with potential emergencies; difficulty in providing in-service training programmes for remote area personnel; and also, the feeling of isolation experienced by such personnel. One of the most useful techniques in such situations is teleconferencing.

TELECONFERENCING*

The term "teleconferencing" refers to meetings between geographically separated groups using telecommunications systems.

There are three types of teleconferencing:

1. Audio Conferencing;
2. Video Conferencing;
3. Computer Conferencing.

AUDIO CONFERENCING

Audio conferencing systems may be quite simple. The equipment may consist of standard telephone sets, an amplified telephone, or a more elaborate conferencing system with loud speakers and a number of microphones set up around a conference room. The microphones may be open, voice-activated, or press-to-talk, or may be controlled by a chairperson.

Audiographics Systems

Visual information can also be transmitted from centre to centre using narrow-band telecommunications channels, such as standard telephone lines or radio. Text, graphs and charts, x-ray pictures, etc. can be exchanged to complement verbal discussion.

*This section owes much to a report: Christine H. Olgen and Lorne A. Parker "Equipment for Interactive Narrowband Telecommunications".

Audiographics systems include a variety of devices some of which are described below:

Telewriters

Telewriters are used to generate and transmit hand-drawn text and graphics over telephone lines. They include electro-mechanical pens, electronic black-boards and tablets and light pen video writers. Telewriters provide a good deal of flexibility and instantaneous transmission of graphics. Some systems produce an acetate copy at the receiving site, others produce an image on a video screen. One interesting device is the electronic black-board which provides a familiar black-board like system which even allows mistakes to be corrected by an eraser attached to the control unit tray. Small computers can be used to transmit graphics similarly.

Slow-Scan Television

Any image that can be captured by a video camera can be transmitted over a regular telephone circuit or FM radio channel and shown as a still image on a television monitor. In most cases, the image forms gradually over a period of 30-120 seconds, but multiple images can be stored in computer-like memories and recalled instantaneously, while another is being put into the memory. Slow scan pictures do not show motion, but movement is not needed in many situations.

The basic units in a slow-scan television system are a video camera, transmitter, receiver, and television monitor, but auxilliary devices can be interfaced to the system. Hard copy reproduction of the images is possible.

Facsimile or Telecopier Machine

A minimum system consists of two machines which are usually inter-connected by standard telephone services. Documents are scanned by one machine and the signals are sent to the other machine and reconstituted there as a copy. The whole process requires between fifteen seconds and six minutes per page depending on the machine and the degree of resolution required. Some copiers can be programmed to operate automatically.

VIDEO CONFERENCING

Full-motion video conferencing is still very much more expensive than audio conferencing although the costs are expected to come down during this decade because of improved technologies.

If costs decline sufficiently video teleconferencing could have very wide appeal. Already there are at least thirteen public and private institutions in North America, Europe, Australia and Japan which have fully operational video conferencing networks, some of which are hired out.

COMPUTER CONFERENCING

Computer conferencing is of particular interest as a means of information sharing for regional institutions. Computer conferencing allows communications through computer terminals which are linked to a central computer. Messages can be sent either publicly to the entire conference group, or privately, to an individual, and a permanent record of the proceedings can always be obtained.

Computer conferencing can accommodate larger groups than audio or video conferencing. This is particularly important in applications that involve information exchange. The technique can easily handle simultaneous usage among several locations and has the ability to retain information for the long term. This makes possible its use in an asynchronous mode. Among the major applications are:

Crisis Management

A particular strength of computer conferencing is crisis management and disaster relief since complex data and graphs can be transmitted efficiently and the users can tap the computer for information and analyses as required.

Education

The University of Michigan is a leader in the use of computer conferencing for educational purposes. Since its inception in 1975 over 100 faculty members have used the system for teaching, student counselling and information exchange.

Information Exchange

This is potentially one of the most important applications for the Caribbean at this stage. The Universities and Research Institutes in the Region, the Development Banks, and the Caribbean Community could make use of computer based systems to prevent duplication of efforts, to transfer information as needed, and to aid in decision-making.

Design Factors

A computer conference system can be very simple. Sophistication and costs must be balanced, but costs need not be high. The reliability of both the computer and the communications network is the crucial factor.

Systems

The user requires a computer terminal with a telephone acoustic coupler to provide access to a central computer with the necessary buffer, storage and software. Any institution can create its own network and already there are at least three systems in the United States, offering computer conference facilities (one of these is at the University of Michigan) and two services are available in Sweden.

The systems can be designed so that the user need have little or no experience with computers.

TELECONFERENCING VS TRAVEL

Teleconferencing is increasingly seen as a substitute for travel. In 1978 alone, travel costs increased 40 percent while teleconferencing costs decreased 10 percent. Teleconferencing is likely to be used increasingly to replace business travel in order to reduce costs, but teleconferencing can also lead to more rapid and greater participation in decision making.

ELECTRONIC MAIL

Increasingly, governments, businesses and many others are taking advantage of electronic communications systems such as: facsimile, computer based messaging systems, communicating word processors and hybrids. Of these facsimile is probably simplest for the user and there are presently some 200,000 in use in the United States alone.

Computer based systems have been described above.

Communicating word processors allow one organisation's word processing system to communicate with another's computer or terminal. It is claimed that a word processor can reduce the work load of a large office by about 30 percent, if the system has communication capability.

Hybrid electronic mail systems are available internationally. Examples of hybrid mail systems are Western Union's TWC/TELEX and Mailgram services. These transmit the information electronically to a telewriter, where it is printed out in hard copy form.

The demand for electronic mail is increasing rapidly and the techniques will also be useful in the provision of education or other public services at a distance.

CHAPTER THREE

SOME APPLICATIONS OF TELECOMMUNICATIONS IN EDUCATION AND PUBLIC SERVICES

This chapter outlines some of the applications of communications techniques. In most applications, education is a component of the programme but it is convenient to consider the headings: Education, Agriculture and Telemedicine.

EDUCATION

Distance education has been a major application of the communications technologies. A small selection is reported on here by country of origin of the programme.

UNITED STATES OF AMERICA

There have been a large number of experiments and demonstrations in the United States of America on telecommunications applications in education. Only two examples, chosen because they appear to have some relevance to the Caribbean situation, are given here:

Appalachian Education Satellite Programmme (AESP)

This programme began to use NASA's ATS-6 in 1974 to broadcast education courses to residents of the 13 state Appalachian region which includes extensive depressed areas. By 1979, the programme was broadcasting to 60 sites in 13 states providing University courses at the undergraduate and graduate levels and short workshops in education, human resources and services, medicine and health, business and industry and government.

Following this successful demonstration and needs assessments, AESP has expanded its public service programming and has contracted for 2,000 hours per year (about 30 hours per week), on RCA's SATCOM I. A tuition fee which is shared by AESP with participating institutions is charged for all courses and workshops and AESP expects to be fully self-supporting by 1982.

Educational Telecommunications for Alaska (ETA)

A five year long educational telecommunications project which began in 1978 is being examined as a solution to the problem of providing equal education for 14,000 children who live in hundreds of scattered villages without connecting roads. This project is developing and implementing educational uses of telecommunications throughout Alaska. ETA has also established an electronic communications system among the state's school districts, regional resource centres and the Department of Education. They developed a computerised information identification and retrieval system, and

designed and developed telecommunications - mediated instructional courses for use in Alaska's schools.

One component of the project provides for remote computer assisted information searches. An electronic mail service provides a facility to send information anywhere in the network using a system which records the information on a small thin disk for rapid transmission to reduce long distance costs.

The system uses the RCA SATCOM satellite, computers, facsimile, telephone, audio-cassette tapes and printed texts. The approximate project cost is $6 million which is being met by the National Institute of Education and the State of Alaska during the five-year development period. Once in place the system is expected to cost the state $350,000 annually.

CANADA

The Canadian Government began using satellites for educational and public service activities in 1973. By 1976 in a joint US-Canadian project, a high powered (200W) Communications Technology Satellite, HERMES, was built for experimental purposes. HERMES uses the high frequency band 12/14 GHz which allowed the use of small cheap ground terminals to provide telephone, teleconferencing, slow-scan television, facsimile, data transmission, radio and television broadcasting, and both one-way and interactive television links. Two of the programmes are described below:

British Columbia Ministry of Education (Project STEP)

In 1977 tele-education programmes originating at the Provincial Educational Media Centre in Burnaby were broadcast from a 3 metre television transmit terminal via HERMES to five locations in the province equipped with 2 metre television receive terminals. Four locations could interact by satellite with the studio using a voice link, the fifth site, interacted by telephone. The voice channels were connected in a conference network.

The experiment examined the feasibility of programme development, production and delivery by satellite and the follow up of a wide variety of programmes, by a consortium of institutions designed for the general public, students, forest workers, health professionals, librarians, and teachers.

The success of the experiment led British Columbia's Institute of Technology to offer credit courses via satellite. Some courses are taught in class rooms and beamed simultaneously via satellite to 11 college locations in British Columbia and the Yukon territory.

University of Quebec Omnibus Network

The University of Quebec is a community of several widely separated campuses with a mandate to extend access to courses through

telecommunications. In 1976, a satellite was used to create a communication network (Omnibus) between the campuses and local centres. The local centres had 3 metre antennas for earth terminals.

Between October 1976 and March 1977, 12 experiments occupying about 300 satellite hours and using a variety of techniques were carried out. A video link allowed librarians to show tables of contents and abstracts to the students to help select the most appropriate reference material which was then copied by facsimile. The offices of the University Registrars in Hull and Rouyn were able to exchange documents by two-way video.

Telecommunications has become a permanent feature of the University of Quebec.

INDIA

India is one of the world's largest and most populous countries. Despite many achievements including certain aspects of high technology and industry, India is a nation with limited resources and an annual per capita income of approximately US$250. The problems of development are formidable and compounded by the diversity of languages and the very different needs of rural and urban communities.

The Indian Government has set a high priority on reliable telecommunications as a tool for industry and Government and as a medium to aid the development process. As a result of years of study, experimentation and design, an integral multi-purpose satellite ground system with the capacity to serve millions of users throughout India - the Indian National Satellite System (INSAT) is due to begin service in 1982.

The Indian Satellite Instructional Television Experiment (SITE)

SITE was a one year long experiment, which began in August, 1975, on the use of instructional television in rural India. The ATS-6 satellite was used. The entire ground segment of the experiment was organised by the Indian Space Research Organisation. This included village selection, development, installation and maintenance of community receivers, programming and evaluation. Educational programming concentrated on national cultural integration, and the upgrading and expansion of education, health, nutrition and agriculture. All the programmes were specially prepared in India for the SITE project, most of them by the television production unit of All India Radio.

Transmissions from Delhi and Ahmedabad were received via ATS-6 by 2,400 villages in six clusters. Each cluster had one principal maintenance centre and three sub-centres responsible for servicing the community television receivers. The television sets received the satellite signal by use of a 3 metre parabolic antenna of chicken mesh. The equipment was manufactured in India at a total cost of around US$1,000 each receiving ground station.

There were transmissions in four languages twice daily - one and a half hours in the mornings for school educational programmes and two and a half hours in the evening for general audiences. These included: educational enrichment for children, concentrating on strengthening language and mathematical skills at the primary and pre-primary levels, 33 hours of science programmes for training primary school teachers in science. It is estimated that about 96,000 teachers received Teacher Training by ATS-6. In the evenings, non-formal education, mainly in agriculture and health, but also in traditional culture and public affairs was emphasised.

SITE was the first satellite experiment aimed at a mass rural population. It used relatively simple equipment which worked well. It is reported that the experiment was highly successful and that the results achieved would otherwise have required vastly greater efforts than were expended on SITE. India is moving rapidly ahead with large programmes to develop, launch, and utilize a series of new satellites.

THE PACIFIC

The Pacific Ocean is the largest geographical unit on earth. Excluding adjacent seas, it is nearly twice as large as the Atlantic Ocean. Its greatest width occurs at the equator and is nearly 11,000 miles. It includes more than one-third of the earth's area, and contains scattered islands, the majority of which are sparsely populated. The separation of these populations by very large distances puts communications at a premium.

Several Pacific states have been making use of the old (launched in December 1966) ATS-1 NASA satellite which is still operating reasonably well in geosynchronous orbit at longitude 149 degrees West. From this position it covers about one-third of the earth's surface including most of the Pacific Ocean, extending from 145 degrees East, the middle of Australia, to 60 degrees West, including portions of the Eastern United States and the Caribbean.

ATS-1 is particularly suited for the Pacific communications networks since it provides such a wide beam and also permits the use of small and simple ground terminals. The ground terminals are owned and operated by nine different government agencies or regional educational institutions, licensed by ten different telecommunications authorities and used by the PEACESAT consortium and the University of the South Pacific for a variety of purposes.

Another interesting Pacific communications system which is only mentioned here is the Cook Islands High Frequency Radio Network.

PEACESAT

The Pan-Pacific Education and Communication Experiment by Satellite has been demonstrating the benefits of direct conference communications across the Pacific. ATS-1 satellite is used to provide the communications links between 18 sites as shown in Figure 1 which

is taken from the front cover of SATELLITE, the PEACESAT bulletin.

The total cost of each transmit-receive unit, including antenna, ranges from US$2,000 to US$7,000, depending on terminal power. The terminals are easy to operate and maintain. Operators have limited experience for the most part, although technically trained back-up persons are normally on call.

The network is used mainly for informal conference type discussions between panels of speakers at two or more terminals and has provided support to a variety of programmes in health, education and agriculture.

PEACESAT has been of great value in medical emergencies. For example, it allowed health personnel in remote areas to obtain outside diagnostic advice in cases of cholera and dengue fever epidemics. During these epidemics, researchers, doctors and public health personnel in Australia, New Zealand and many Pacific Islands held medical conferences as often as required. Other medical uses of PEACESAT have involved diagnostic consultations, administrative planning, in-service training, provision of medical library information, public information on health education and test transmissions of x-rays and electro-cardiograms.

Figure 1: stations in the PEACESAT network.

PEACESAT has been utilized for a wide variety of educational, scientific and other programmes. Library materials have been exchanged between distant locations and seminars have been conducted by teleconferences. The network is regularly used for agricultural seminars on topics such as horticulture, animal husbandry, land development in the tropics, plant quarantine and post harvest preservation.

Initial funding for the programme was provided by numerous agencies and institutions but local institutions now meet capital and operational costs of the terminals. Users of PEACESAT express enthusiasm about the ability of the system to raise the quality of education in the Pacific by facilitating sharing of costly resources, improving professional services in sparsely populated areas, and generally contributing to the development of the Pacific region.

The University of the South Pacific (USP)

The University of the South Pacific is one of the world's only two regional universities. It was founded in 1967 and now serves 11 countries: Cook Islands, Fiji, Kiribati, Nauru, New Hebrides, Niue, Solomon Islands, Tokelau, Tonga, Tuvalu, and Western Samoa. These countries with a total land area of only 11,000 square miles are dispersed over an enormous oceanic area. The populations add to about 1.5 million persons ranging from 20,000 in the Cook Islands to 600,000 in Fiji. With this population distribution, the regional model may be the only economic way to provide higher education.

The major campus is the Laucala Campus in Fiji. A second campus, at Alafua in Western Samoa, houses the Faculty of Agriculture and a third campus is being developed in the Solomon Islands. A regional network of University centres was established early.

USP provides a wide range of undergraduate programmes with a vocational orientation, and shorter diploma courses, closely designed to fit the training needs of the region. The Extension Programme is a major University offering; the Introductory Courses and almost all Foundation Level Courses, except the Natural Sciences are available through extension. From 1975 onwards, there has been a growing demand for Degree Level Courses by extension.

Student Numbers

Based on 1979 statistics, the University of the South Pacific has 525 full-time degree students and 923 Preliminary, Foundation, and Diploma students. There were 317 part-time undergraduates and 18 postgraduates. The numbers in the extension and other similar programmes are in Table 2. Other institute programmes accounted for another 818 students.

Table 2: Student enrolment in Extension Studies and similar Programmes in the University of the South Pacific (1979).

Country of Origin	Extension Non-Degree	Extension Degree	Cont. Educ.	Other Inst.	Total
Cook Islands	66	28	262	78	434
Fiji	266	27	782	293	1,368
Kiribati	108	35	473	30	646
Nauru	29	3	-	2	34
New Hebrides	24	3	-	64	91
Niue	70	6	142	26	244
Solomons	41	19	110	84	254
Tokelau	-	-	-	2	2
Tonga	84	36	1,016	155	1,291
Tuvalu	16	12	-	14	42
Western Samoa	74	83	386	63	606
Others	-	-	-	7	7
Total	778	252	3,171	818	5,019

The Extension Courses are now broadly based providing for practising teachers and for a range of students who work both in the public and private sectors.

Communications Project

As long ago as 1974, USP began to experiment with interactive satellite broadcasting. This project now uses narrow-band technologies including slow scan television, facsimile and small computers to:

1. Provide courses to students in their territories by using satellite communications for:
   - delivery of course materials;
   - tutorials;
   - course management, administration, logistics.
2. Disseminate development-related information from various University and Development Agency sources (e.g. University Institutes, Agriculture Colleges, Regional and International Agencies) to key development personnel in member countries through:
   - specially developed audio-visual materials;
   - conferences and seminars conducted by satellite.
3. Improve the effectiveness of outreach development workers, e.g. extension workers, health para-professionals, primary teachers community development workers, etc. by using satellite communications for:

- co-ordination of outreach activities;
- in-service training and upgrading;
- consultation with research persons;
- delivery of development information for dissemination by outreach personnel.

The project will also evaluate the effectiveness of the various communication technologies being used and identify the USP's regional communication requirements and make plans for transition to an operational service. This project has fired a great deal of enthusiasm. It will probably be a bench mark in the use of satellite communications in the developing world and obviously there ought to be a great deal of interaction between USP and UWI, if the latter also initiates a system of teaching and outreach using commuications technologies.

AGRICULTURE*

This section gives a few examples of uses of telecommunication technologies in agriculture classified according to techniques.

RADIO

Radio has been widely applied and well studied in relation to agricultural and rural development. In a 1965 report, UNESCO concluded: "Radio broadcasting when carefully used, is proving to be one of the most effective media of communication with...far flung populations."

Radio continues to play a major role in many agricultural development efforts but it is not a self-sufficient medium and really requires also the use of printed materials, two-way correspondence, and various educational materials. Also conventional radio broadcasting does not allow the interaction now generally considered necessary to persuade the listener to adopt a specific practice. Two-way radios help to overcome this limitation.

TELEVISION

The impact of television in agricultural improvement schemes in developing countries although of promise has not been well explored. Like radio, conventional television is limited to one-way communication but this can be offset by combination with return audio

*This section is based on a report "Alternative Communication Technology to Serve Agricultural Extension and Development in the West Indies" by Burton E. Swanson and Raymond A. Woodis, under a contract between the University of the West Indies and the Academy for Educational Development.

by radio or telephone. Television receivers are however expensive.

AUDIO-CASSETTES, VIDEO-CASSETTES, SLIDE TAPES

Audio cassettes have several advantages:

Tapes can be produced specifically to meet the interest of a relatively small audience; they can be produced in a local dialect for maximum understanding; the pace and order of presentation can be controlled based on the needs of the particular group.

Pre-recorded cassettes assure a degree of uniformity - all groups get the same basic message, subject, of course, to interpretation by the person who presents the programme. Audio cassettes can be combined with slide tapes, picture-story books, posters, charts, etc. to enhance the educational message.

Video cassettes offer the same advantage over audio cassettes as television over radio. There is a growing interest among agricultural developers in many countries, the Phillipines and Sri Lanka, for example, to use video-tapes in programme delivery and reporting, in addition to, or instead of film.

INFORMATION SYSTEMS/DATA BASES

There are presently a number of agricultural data bases which can be accessed in the interactive mode by what are now standard techniques, using telephone lines. Since the application to agriculture presents no novel features this sub-section will describe instead some other types of computing applications.

AGNET-University of Nebraska

The University of Nebraska maintains an Agricultural Computer Network. This is a remote access computer data base developed for extension programme delivery and assistance to users in some 25 States. County Extension Staff serve as contact points for farmers, ranchers, agricultural banking and lending institutions, farm managers, consulting firms and others who want information about, or to use, the system.

Fast Agricultural Communications Terminal Systems (FACTS)

The Fast Agricultural Communications Terminal System, developed by Purdue University is a new state-wide system.

As an Extension educational tool, the FACTS computer network provides rapid, detailed information dissemination, a memory capability for recalling data, and a computing capability for rapid analysis of problems and alternatives. Intelligent terminals (capable of operating off-line when not connected to the computer) are located in all 92 Indiana counties.

Access is by typewriter-like terminals through any regular telephone line to a central computer on the University of Nebraska Campus. The terminals are portable and can be used anywhere there is an electrical outlet and a telephone.

TELEPHONE NETWORKS

Telephone networks are being used for agricultural programmes in the United States. Some examples are given below:

TeleNet-University of Illinois at Urbana-Champaign

The TeleNet system of the University of Illinois at Urbana-Champaign is a dedicated telephone network which provides two-way audio interaction between 66 sites. Audio-visual support materials to be used in conjunction with the lectures or discussion are distributed to the receiving locations in advance.

TeleNet is operated by the University of Illinois Co-operative Extension Service and co-ordinated by the Office of Agricultural Communications.

The majority of the programmes concern extension services; in-service education for county personnel, seminars, workshops and short courses in agriculture, home economics, 4H and youth, and community resource development for extension audiences throughout the State. As well as extension administrative liaison TeleNet also carries credit courses including graduate courses to professionals through the State. Instructors and students have been generally satisfied with the quality of the programmes, the learning experience, and the saving in travel costs and time. The system has also contributed significantly to in-service training.

Regular weekly reports and conferences provide a two-way flow of information to monitor the incidence, spread, and potential seriousness of various agricultural problems throughout the State.

University of Wisconsin-Extension

Wisconsin makes use of the Educational Telephone Network (ETN) to keep county agricultural agents up-to-date on developing agricultural situations. A weekly programme with agricultural specialists discussing current agricultural problems and solutions has proven to be a popular in-service training and informational programme. More structured in-service education opportunities for country extension staff are also provided.

Studies indicate that there are no significant differences in amount of knowledge gained using ETN and conventional training.

TELEMEDICINE*

The improvement of health programmes in the less developed countries and in rural communities is a widely accepted priority. The full realisation of this goal is, however, not at all easy. It not only requires resources but may indeed be dependent to a considerable extent on new approaches because of frequent shortages of personnel willing to serve in distant rural communities and the likelihood that certain such communities are too small to afford the operations of the full health team.

Adequate transportation and communications offer solutions to some of these problems, and have long been fundamental to good health care delivery, but it is with the availability of newer technologies that telemedicine, the use of telecommunications for health care delivery, has come into its own. Telemedicine provides both improved access to the health care system and improvement of the capabilities and efficiency of the system. This makes possible, inter alia, the following activities:

CONSULTATION, EXAMINATION AND DIAGNOSIS AT A DISTANCE

Telecommunications has helped provide both primary and secondary care where there are barriers to face-to-face contact.

Primary Care

The use of telecommunications to link isolated para-professionals and physicians is a significant development in telemedicine. Para-professionals are frequently involved in:

- first-line diagnosis and treatment;
- early identification of serious problems;
- local preventive care (e.g. inoculations);
- contraceptive dispensing, prenatal clinics, etc.;
- community health education.

By use of communications systems, para-professionals at remote sites can describe signs and symptoms to doctors in centres for assistance with diagnosis and treatment, and obtain a management plan for the case.

Secondary Care

*This section relies heavily upon the following reports prepared by the Academy for Educational Development, Washington D.C.: Douglas Goldschmidt, Heather E. Hudson, Wilma Lynn, Two-way Radio for Rural Health Care: An overview, May, 1980. Heather E. Hudson, Telemedicine: Some findings from the North American Experience, June, 1980. Wilma Lynn, Two-way Communications Case Studies on Applications for Rural Development in North America, Latin America and the Pacific, December, 1979.

Telecommunication techniques allow consultation between physicians located in clinics or rural hospitals and specialists at a major medical centre which may be very far away. The use of audio only by telephone or radio is obvious enough, but the physician can also carry out certain examinations at a distance. X-rays, electro-cardiograms and heart sounds are examples of the sort of medical information which can now-a-days be routinely transmitted from one site to another.

Supervision

Remote supervision and consultation allows the substitution of health workers for more skilled staff without sacrificing quality of services. This takes place in the field, of course, but there are examples in which a limited number of specialists operating from a central point can provide back-up services for a much larger number of other workers.

ADMINISTRATION

Two way communications can play an important role in administering health programmes. This may be routine as in the ordering and shipping of supplies and spare parts or an instant alert may be sounded in cases of serious outbreaks of diseases in remote locations. This link can be extremely useful in taking actions to counter the situation. Disaster relief is another important area of application.

EDUCATION AND TRAINING

Experience with the use of telecommunications for medical education has been growing over the past decade. Educational programmes, credit and non-credit, lectures and seminars for physicians and para-professionals, and grand rounds for physicians have been held, often in the interactive mode.

EXAMPLES

Recent reports on telemedicine list more than 50 telemedicine applications in over 25 countries. From these we have selected the following examples which illustrate how countries are applying telecommunications to their health problems.

Africa

In Kenya and Tanzania, the African Medical Research Foundation (AMREF) provides a radio network linking some 86 Mission/Government hospitals and mobile units in Nairobi. Each station checks in daily with the radio room operated by four nurses in Nairobi to arrange for medical and surgical visits, supplies, laboratory reports and other matters.

The smaller out-stations may have one nurse or a medical assistant in charge. AMREF statistics for the late 1970's show the following frequencies of radio calls: medical advice, consultations, patient inquiries, 25 percent; supervision and administration via daily call-in messages, 29 percent; travel arrangements related to AMREF's Flying Doctor operations 19 percent; drug orders and related messages 2 percent; other calls 25 percent.

Australia

Australia is a vast territory with a relatively small and widely scattered populaton. The distances between hospitals and health care centres can be very large. Many small townships and settlements rely on health centres staffed by nurses for their primary health care, while many mining camps and large rural properties have no resident health person. In such situations, the Australians have put both transportation and communications to work, and throughout Australia, telecommunications are extensively used in medicine. The Royal Flying Doctor Service and the Northern Territory Aerial Medical Services provide both for emergency and routine visits. These services rely heavily on the use of telephone and radio-telephone. In 1976/77, 15,240 medical consultations were carried out over radio networks and 5,787 by telephone. The recurrent costs of ground links alone for telephone, telex, facsimile, etc., for 1977/78 financial year were some $11 million (Australian).

Long distance radio services often suffer from poor quality transmissions and the lack of guaranteed continuous coverage. The improvement of the medical services in remote areas has been recommended as a major application of the proposed Australian National Satellite Network.

Alaska

Alaska is huge and sparsely populated. Most of its 350,000 people and the majority of its health care services are concentrated in a few urban areas away from the small villages with typical populations of 25 to 500 people which are scattered throughout the State. Few of these communities have telephone service, electricity, running water or sewerage systems. Most can be reached only by plane or boat.

Health service has been provided by a system of small field hospitals located around the state, with a referral hospital in Anchorage. However, because the villages are often entirely cut off, a system of local primary care provided by health aides had to be established. The field hospital contacts the village health aides each day for a scheduled consultation using simple two-way short-wave radios. The same frequency is used in a given area so the health aides there can all hear the consulations.

Because severe electrical interference, infrequent maintenance, long distances, and mountainous terrain cause HF radio communication to be unreliable in many parts of Alaska, experiments with satellite

systems began in 1974. This led to a great increase in the frequency of communications between doctor and health aides in both the villages and regional hospitals and patients were diagnosed and treated more efficiently than previously. Another benefit was the increase in the self-confidence of the aides using the system.

Due to the success of the first system using the satellite, further experiments were carried out with ATS-6 and an operational network is now in place.

APPLICATIONS IN URBAN AREAS

Although telemedicine grew in importance through service to remote areas, certain aspects of its armoury offer the possibility of greatly improved services in urban areas. The examples below illustrate some of the work being done in large cities.

The Massachusetts General /Logan Airport Microwave Link

Primary health care is provided at Logan Airport by nurse clinicians who can elicit narrative histories, perform basic physical examinations, and do laboratory work including urine analyses and blood counts. A remote physician can study the patient and laboratory specimens by television, do ausculations using an electronic stethoscope, and receive ECGs, pulse rates, respirations and systolic blood pressure.

One camera in the medical station laboratory is connected directly to a binocular microscope, enabling both the microscope operator and the distant physician to view specimens simultaneously. The physician can select pictures from any one of the cameras and can write prescriptions by means of a telewriter.

Jackson Memorial Hospital/Miami

Jackson Memorial Hospital in Miami operates a jail health care system that serves 1,500 members of the Dade County jail system. By utilizing a black-and-white television system, voice channels, electronic stethoscopes and facsimile, the staff of 45 have reduced patient costs by approximately one-half. The system links together three Dade County jails and Jackson Memorial Hospital.

Support and Supervisory Services

One system in Chicago allows a limited number of physician-anaesthetists in a central location to support many more nurse-anaesthetists in many hospitals by using two-way television between the operating rooms and the monitoring room. The distant specialist can see the patient and the instrumentation, tanks, meters, and drug labels, as well as the anaesthesia record. ECG tracings are displayed on a video screen. Heart beats or blood pressure sounds can be heard using an electronic stethoscope. His comments and instructions go directly and immediately to the theatre.

Another example also in Chicago is in a large hospital complex which includes two community hospitals, three store front health centres, and three drug rehabilitation clinics within an area of one square mile in which a pharmacist supervises pharmacy apprentices via video-phone.

INFORMATION SERVICES

Another widespread application of telemedicine allows public access to general medical information by use of standard telephone equipment. Examples are:

- RISE, an information/education system that serves seven health-care institutions in Central Maine;
- Can-Dial, a cancer information telephone facility operating in Buffalo, New York;
- Tel-Med, a medical information telephone service operating in Winston-Salem, North Carolina.

Telemedicine is a powerful tool in many situations and promises a multiplier effect on scarce skills through supervision at a distance.

EXAMPLES OF USES OF TELECOMMUNICATIONS IN THE CARIBBEAN FOR PUBLIC SERVICE, EDUCATION AND RESEARCH

The use of telecommunications for various purposes, in the Caribbean is growing in importance. The use of two-way very high frequency radio, is now quite common in business, security operations, hospitals, administration, etc. There is also significant amount of educational broadcasting using both radio and television. Some information on a selection of these follows:

EDUCATIONAL BROADCASTING

For many years the Caribbean territories have been broadcasting formal and/or informal education programmes mostly by radio.

Formal Educational Broadcasting

Radio

There are programmes in Barbados, Belize, Dominica, Guyana, Jamaica, St. Kitts, St. Lucia and Trinidad and Tobago. Jamaica broadcasts some two and one half hours per week and three hundred fifteen minute programmes per year to approximately 600 receivers in schools. The other territories average slightly under two hours of

school broadcasting weekly in various subjects which include: music, science, language, literature, agriculture and social studies. The audiences vary from territory to territory, but cover grades one to eleven.

Television

Formal educational television programmes are transmitted only in Barbados and Jamaica. Barbados telecasts Science and Spanish courses for one hour each week to ten Secondary Schools. Jamaica programmes twelve hours per week and some 720 half-hour programmes per year. These are locally produced except for a small percentage of film inserts. The programmes are aimed at grades one to nine. Included are programmes in Science, Metrication, Spanish, Personnel Development and Agriculture. There are an estimated 500 television receiving sets in the formal school system.

Non-Formal Educational Broadcasting

Radio

The territories broadcast an average of 5.4 hours weekly of non-formal educational broadcasts. Of this, perhaps 50 percent is imported. Government Information Agencies, Family Planning Boards, Literacy Associations and the University of the West Indies produce programmes. Popular subject areas are: Agriculture, Health, Family Planning, Youth, Tourism, Co-operatives and Literacy. The Jamaica Adult Literacy Foundation (JAMAL) alone produces some 340 half-hour programmes annually.

There is to be a Jamaica Broadcasting Corporation Radio Central experiment in the Pinders River Area of Central Jamaica, financed by USAID, to examine the use of non-formal radio education in agriculture, literacy, health, education, family life education and nutrition for adults. This programme will support the Integrated Rural Development Project which aims to raise the standard of living of 5,000 small hillside farmers.

Television

Antigua, Bahamas, Barbados, Jamaica, St. Kitts and Trinidad and Tobago presently transmit non-formal educational programmes. An average of 1.5 hours per week is produced locally while an average of 3.8 hours per week is of foreign origin. JAMAL in Jamaica produces 170 half-hour programmes of non-formal educational broadcasting annually.

Two-Way Radio in Guyana

A two-way radio system was established in 1979 to link MEDEX facilities in Georgetown with nine rural locations including two cottage hospitals and seven dispensaries. The system is operated by a team of mid-level health care providers and staff at the Georgetown MEDEX headquarters in Lilendaal and at Georgetown Hospital.

The radio is used for emergencies, medical consultations, administrative problems (i.e. drug ordering, transportation arrangements, etc.), problems affecting MEDEX in the field and evacuation of patients. Other agencies have also been using the network to facilitate their own work.

INFORMATION RETRIEVAL

On-line access to information and data from computerised information services is now a relatively simple matter. Small computer terminals and standard telephone or telex lines are used. From the Caribbean a user would normally link by telephone (or telex) first to a communication modem in Florida from which access to the appropriate information service is made easy (and cheap) by the excellent U.S. computer telecommunications network. The system is fully interactive and the display, both questions and answers, is obtained on a television screen or on paper. The computer can also print out off-line and the prints are mailed to the user. Typical costs exclusive of the overseas link to Miami might range from $30 to $100 (US) per hour. A typical search may last from ten minutes to perhaps one hour for a rather long one.

There are at least four operating terminals located as follows:

1. CARIRI - St. Augustine, Trinidad;
2. Ministry of Education, Jamaica;
3. University of the West Indies, Mona, Jamaica;
4. Cable and Wireless (WI) Ltd., Barbados.

This application will increase in importance and Caribbean data banks are now being developed.

TELEMETRY

Telemetry - the transmission of data in coded form from a sensor to a central point is now common. It is an essential ingredient of every space programme, but is also necessary for much scientific work. An early application in the Caribbean is in meteorology, but there is a growing number of others such as the radio data link throughout the islands which delivers seismic data to the Seismic Research Unit on the St. Augustine Campus of the University of the West Indies. This is described below:

The Use of Telecommunications by the Seismic Research Unit*

The Seismic Research Unit was established in 1953 to advise Regional governments on the nature and hazards of volcanic activity and other geophysical phenomena, such as earthquakes, where these

*The material for this section was taken from a report commissioned from Dr. W.P. Aspinnal of the Seismic Research Unit.

affect the English speaking territories. Early monitoring efforts with photographic-type seismograph recorders emphasised so many problems that by the 1960's experiments with a few automatic remote stations linked by radio to a central recording site, began in Jamaica and Trinidad.

Operations extending the number of fixed radio telemetry stations started internally in Jamaica in 1974 using private VHF radio links and commercial microwave services, and were expanded to include the Windward Islands in 1977 and the Leeward Islands in 1980.

Telemetry Operation Configuration

A typical outstation comprises: a seismometer (velocity transducer), an amplifier-modulator which converts the ground velocity signal into a frequency-modulated audio tone and a VHF radio transmitter with standby power facilities. The audio tone is one of the eight constant bandwidth frequencies between 680 and 3060 Hz as specified by the Inter-range Instrumentation Group (IRIG) for low frequency telemetry. The standby power system is usually a 12 volt car battery charged either from a mains supply or by solar or wind-powered generators. All electronics in the outstation package have been built in house or selected for operation at this single supply voltage to minimize battery costs and balanced-supply problems.

Where the outstation is also a relay point on the network, a radio receiver accepts tones from the station up-link, the local tone is mixed in and the increased bundle is sent out on the transmitter. A total of eight channel individual tones on one voice grade link is possible, but filling the channel invariably results in some degradation of quality particularly where multiple links using inexpensive radio pairs are involved, such as in the case in the Eastern Caribbean. Because it is necessary for monitoring to be a continuous 24 hour per day operation and because power cuts are not uncommon, power consumption at each outstation is minimized to provide the maximum standby duration for any single battery capacity; this is achieved by using the minimum transmitted r.f. power needed to reach the next station and the majority of links are made with 1W output in the 148-174 MHz bands. Only on the longest legs, e.g. Barbados to St. Lucia and Dominica to Montserrat, are used with high powers of about 15W r.f.

The Networks of the Telemetered Seismograph System

The Seismic Research Unit currently operates about 22 seismographs configured in three networks: one in Jamaica, one in the Windward Islands and Trinidad and Tobago and the third covering the Leewards.

The seven stations which comprise the network in Jamaica are shown in Figure 2.

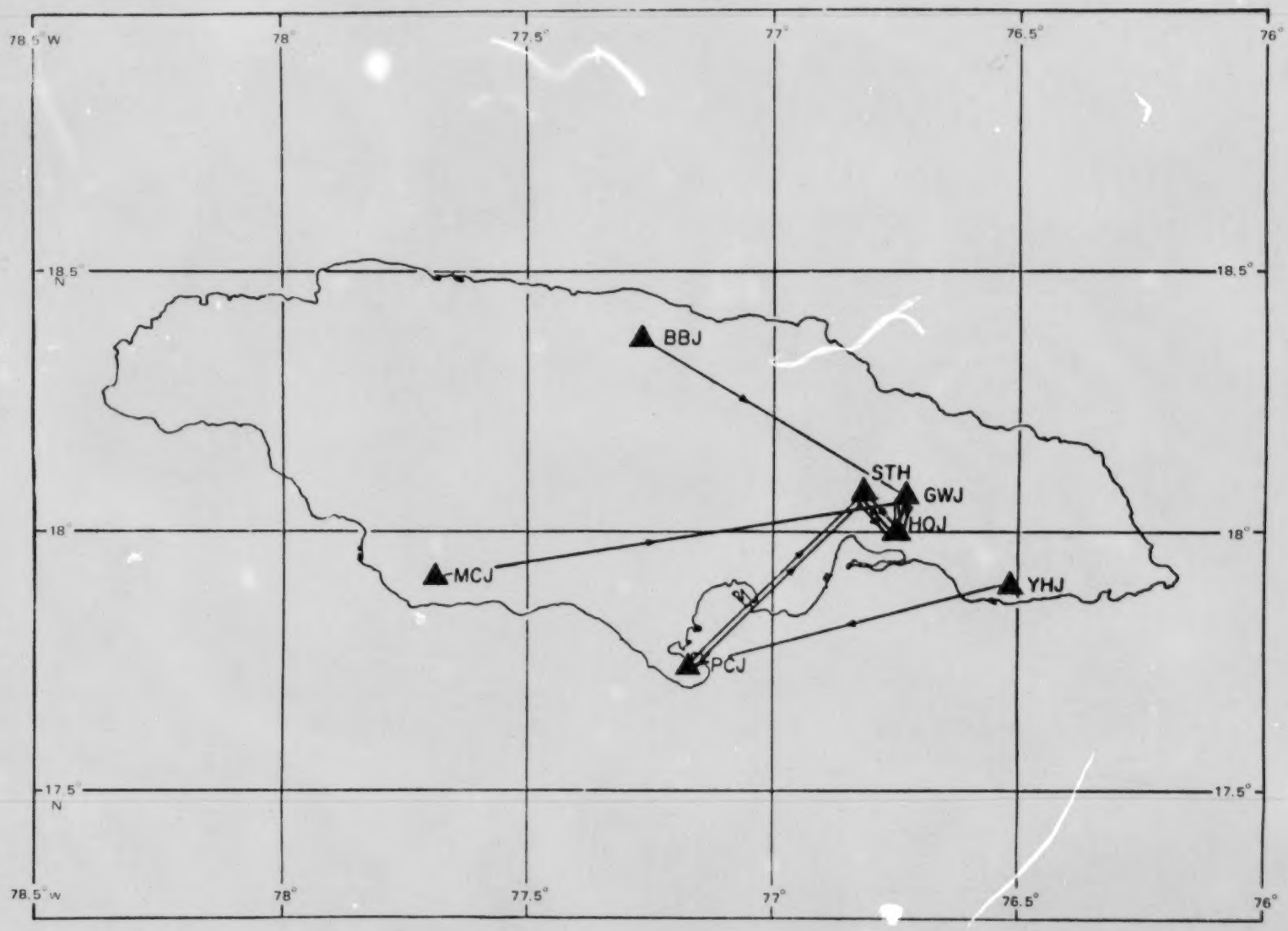

Figure 2: Seismic Telemetry data links within Jamaica.

Central recordings on magnetic tape are made at the Mona campus of the UWI. The stations make up two sub-nets; a tight trio around Kingston and four outer stations giving more general coverage. Various types of links have been employed; private VHF and UHF radios are currently in use and at times the services of a commercial microwave network have been utilized. One of the outstations, PCJ at Portland Cottage, uses solar-panels for powering.

The Windward Islands network was constructed by stepping outwards from existing telemetry in Trinidad and Tobago to Grenada, St. Vincent, St. Lucia, and Dominica. A spur link between Barbados and St. Lucia brings data from that island into the system. More recently, as the result of hurricane damage, the outstation in Dominica has been rerouted to Montserrat and the Leeward Islands net, and radio links have been doubled up from St. Vincent to the Seismic Research Unit in Trinidad. This is to accommodate the extra station involved in monitoring the active volcano, Soufriere of St. Vincent. This network is shown in Figure 3. All these links are simplex VHF radios built and operated by the Seismic Unit.

The Leeward Islands and Dominica are similarly linked together by simplex VHF radios with Antigua as the central data collection point. This network overlaps with that operated by the Lamont-Doherty Geographical Observatory of Columbia University and data tones from selected stations are shared. From Antigua the tones are relayed to Trinidad on a leased voice-grade channel in the C & W microwave system; in Trinidad the tones are collected from TEXTEL and routed inland by the TELCO microwave link to the St. Augustine telephone exchange. The final leg, to the Seismic Unit's office is completed with a private simplex VHF link. The leased lines are paid for at normal commercial rates.

At the Seismic Research Unit, all data are recorded on a central magnetic-tape recording facility together with time-of-day derived from a satellite receiver giving standard time relayed from the National Bureau of Standards facility at Boulder, Colorado. In addition, selected stations are continuously displayed on drum recorders to allow immediate visual monitoring of activity.

Benefits and Scope for Further Improvements

Two major benefits have come from the implementation of the inter-island and Jamaica telemetered networks: an almost immediate reaction can be made to the occurrence of a major earthquake or to the development of abnormal volcano-seismic activity where previously data would have been tied up for several weeks in the mails. As a prime example, the fact that abnormal conditions in the Soufriere of St. Vincent were observed and reported to the authorities a few hours before the violent eruptions of 13th April, 1979 was an unprecedented achievement in volcanological monitoring and was possible only because the inter-island network existed. The second benefit is the acquisition of good quality data which will allow refinement of seismological studies of Regional crustal structure. This will lead in time to a better understanding of the tectonic setting of the

islands and hence to improved estimates of the risk of damaging earthquakes.

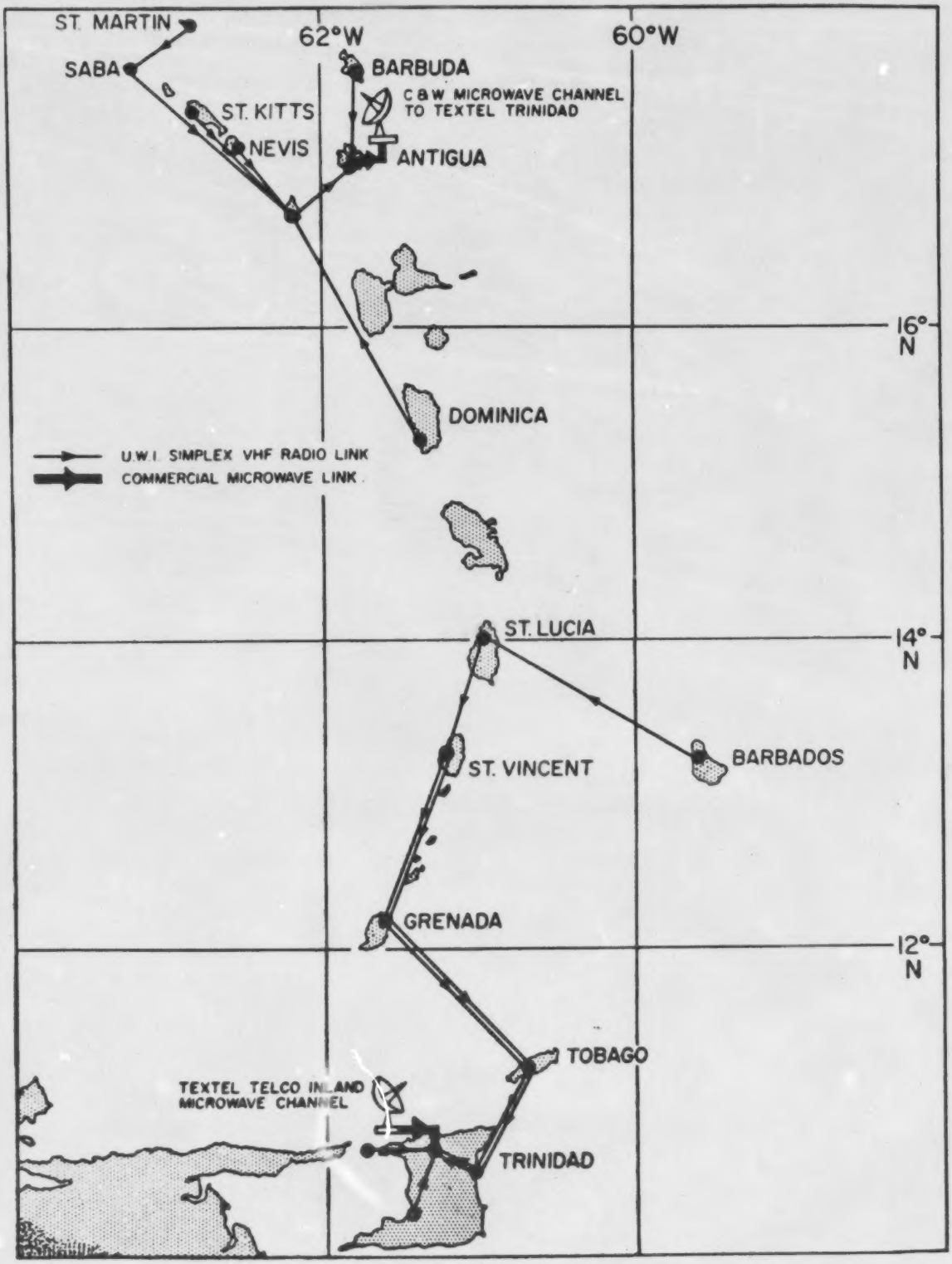

Figure 3: Seismic Telemetry network – Leeward and Windward Islands

The significant improvements, however, have been limited by some constraints; the use of cheap radio-pairs and loading them to full capacity, results in a degradation of information quality and dynamic range, and their installation and maintenance by a few scientists on the staff of the Seismic Research Unit, seriously affects the time spent on analysing the data acquired. The experiments with the channel leased from Cable and Wireless has demonstrated that good quality telemetry transmission facilities can be obtained, which meet the technical requirements of the seismograph works whilst releasing the earth scientists from the tasks of telecommunications engineers. Over the two years that the leased channel has been used, total down-time on the international link has been much less than 0.1 percent and for the inland link less than 0.2 percent. The extension of leased channels to a number of other key islands in the Region would greatly enhance the performance of the monitoring activities of the Seismic Unit.

A final area of difficulty is the one of communicating with the Regional governments in an emergency and with members of the Unit operation in the field during crises. In the night preceeding the eruption in St. Vincent, it took over four hours to get a telephone call to that island and frequently the data processing operations of the Unit are delayed because of a limited ability to communicate with staff in Jamaica or up the islands. Access to the proposed UWI based satellite communications network would be a distinct asset to the operations of the Seismic Research Unit.

PROJECT SATELLITE

The University of the West Indies experiment, "PROJECT SATELLITE" examined:

(i) the technical feasibility of delivering outreach programmes in the region served by the University;
(ii) the level of user acceptance - and enthusiasm - generated by the technology;
(iii) the usefulness of satellite mediated video lecture courses;
(iv) the value of teleconferencing and consultation by satellite as an effective co-ordinating activity for teaching, research, and administration.

Activities

Twenty-seven televised programmes in colour, totalling 34.5 hours were organised and produced by UWI staff, with collaboration from many institutions, such as the College of Arts, Science and Technology, the JAMAL, the Jamaica Broadcasting Corporation, Goddard Space Centre, the University of Miami, and the Solar Energy Research Institute in Colorado.

The types of activities undertaken were:

- University outreach programmes;
- guest lecture series to students in several faculties;
- seminars by teleconferencing (solar energy, special education, and agriculture);
- administrative teleconferences.

The programmes included seminars, discussions on rural medical care in the Caribbean, agricultural research in rural areas, the nurse practitioner programme, family-life education programmes in the schools, early childhood education (community-oriented attitudes, services and research), and co-ordination of University Centre Libraries.

A special audio teleconference was held to demonstrate communication links over extremely large distances: The Mona and Cave Hill campuses of the University of the West Indies, held exchanges with PEACESAT sites at Wellington, New Zealand; Suva, Fiji; Niue; Rarotonga, Cook Islands; Hawaii; Tarawa, Kirbati; and Santa Cruz, California. The link-up between the ATS-1 satellite used by the PEACESAT group and ATS-3 used by UWI was via Denver, Colorado.

CHAPTER FOUR

A POSSIBLE USER: THE UNIVERSITY OF THE WEST INDIES

Founded in affiliation with the University of London, the University College of the West Indies became an independent University in 1962 and is now a three campus institution with eight faculties - Agriculture, Arts & General Studies, Education, Engineering, Law, Medicine, Natural Sciences and Social Sciences - with about 9,000 students, of whom about 10 percent are postgraduates.

Fourteen Caribbean territories support the University of the West Indies. Ten of these, viz: Antigua, The Bahamas, Barbados, Belize, Dominica, Grenada, Jamaica, St. Lucia, St. Vincent, and Trinidad and Tobago are independent nations. The remainder, namely, British Virgin Islands, The Cayman Islands Montserrat and St. Kitts/Nevis are associated in one way or other with Great Britain. The University also provides services for Guyana and to a lesser extent to Anguilla and the Turks and Caicos Islands.

The Campuses

The Mona Campus in Jamaica is the oldest and largest. There, some 4,500 students take programmes in one or more of the Faculties of Arts and General Studies, Medicine, Natural Sciences, Social Sciences and the School of Education (Western Area). A 520 bed Teaching Hospital is located at Mona.

There are some 2,900 students at the St. Augustine Campus in Trinidad. The Faculties there are Agriculture, Arts & General Studies, Engineering, Natural Sciences, Social Sciences and the School of Education (South Eastern Area). A large expansion of the Faculty of Engineering and developments for the provision of a new Medical complex and Schools of Dentistry and Veterinary Medicine are underway.

The third Campus is at Cave Hill in Barbados where some 1,600 undergraduates read for degrees in Arts & General Studies, Law, Natural Sciences, and Social Sciences. The North-Eastern Area of the School of Education is in Cave Hill.

Teaching and Research Staff

There are 880 full-time academic and senior administrative staff of whom about 75 percent are West Indians.

Student Numbers

The undergraduate student body is drawn almost entirely from the countries of the Region. The growth of total student registration is illustrated in Table 3.

Table 3: Growth of Total Student Registration.

Year	Men	Women	Total
1948/49	23	10	33
1951/52	152	53	205
1954/55	275	109	384
1957/58	354	201	555
1960/61	657	320	977
1963/64	1,465	722	2,187
1966/67	2,047	1,212	3,259
1969/70	2,914	1,713	4,627
1972/73	3,739	2,587	6,326
1975/76	3,994	3,263	7,257
1978/79	4,477	4,042	8,519
1979/80	4,762	4,224	8,986
1980/81	4,684	4,374	9,058

The numbers of Degrees awarded each year between 1952 and 1981 are shown in Table 4.

Table 4: Degrees Awarded in Undergraduate Programmes (1952-81).

	Med.	Nat. Sc.	Arts & G. S.	Soc. Sc.	Agri.	Eng.	Edu.	Law	Total Degrees
1952	-	11	-	-	-	-	-	-	11
1953	-	15	20	-	-	-	-	-	35
1954	13	11	18	-	-	-	-	-	42
1955	16	19	12	-	-	-	-	-	47
1956	15	11	25	-	-	-	-	-	51
1957	22	21	32	-	-	-	-	-	75
1958	16	24	44	-	-	-	-	-	84
1959	22	29	56	-	-	-	-	-	107
1960	25	21	68	-	-	-	-	-	114
1961	31	33	56	-	-	-	-	-	120
1962	30	45	71	27	-	-	-	-	173
1963	31	47	96	54	7	-	-	-	235
1964	36	72	139	62	7	17	-	-	333
1965	34	80	112	55	23	28	-	-	332
1966	40	84	168	50	18	24	-	-	384
1967	42	86	212	72	15	39	11	-	477
1968	56	98	243	100	22	43	11	-	573
1969	73	112	232	75	28	60	8	-	588
1970	82	132	231	124	24	59	11	-	663
1971	87	172	274	136	47	83	15	-	814
1972	79	207	254	168	27	86	17	-	838
1973	104	206	318	158	34	97	13	77	1,007
1974	112	199	341	178	50	93	16	89	1,078
1975	91	211	416	208	56	75	16	87	1,160
1976	102	234	438	187	70	115	17	112	1,275
1977	105	282	430	199	33	113	21	98	1,281
1978	93	256	427	227	59	111	27	85	1,285
1979	118	267	411	257	50	116	34	108	1,361
1980	107	262	452	257	69	156	46	108	1,457
1981	109	283	467	268	59	155	25	99	1,465

The Funding of the University - Per Capita Costs

The University is funded through a University Grants Committee comprised of Ministers of the participating Governments drawn from certain agreed groupings of States. The Chairmanship of the Committee rotates among the members of Jamaica, Barbados and Trinidad and Tobago. Funding is triennial and based on University's submissions which cover projections, consolidation and new developments. The total University budget for the triennium ending 1981 was about US$85 million.

After subtracting the funds raised by the University staff for research and special projects (this comprises about 20 percent of the budget), the cost of the teaching and other programmes is calculated on a weighted per capita student basis with the results shown in Table 5.

Table 5: Average Per Capita Cost per Student (US$).

Faculty	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Agriculture	3,287	4,478	5,610	5,578	6,768	5,022
Arts & General Studies	2,400	3,196	3,337	3,138	3,558	3,283
Education	2,795	3,488	3,620	3,246	3,553	3,674
Engineering	3,317	4,198	4,560	5,392	5,831	7,769
Law	2,609	3,461	3,687	3,818	4,310	3,764
Medicine:						
Pre-Clinical	3,602	4,618	5,014	4,497	4,855	4,679
Clinical	5,823	9,209	7,968	7,350	8,314	8,488
Natural Sciences	3,075	4,336	4,520	4,158	4,602	4,383
Social Sciences	2,400	3,196	3,337	3,138	3,558	3,282

Each individual Government is billed based on these sums according to the actual number of students enrolled. These sums are the full tuition cost per student in each faculty. A discount is given to the non-campus territories on the basis that they do not receive many of the benefits which accrue to those territories on which there are campuses.

THE FACULTY OF AGRICULTURE

Because of the importance of Agriculture within the Region, the Faculty of Agriculture has a unique role to play in regional development. The Faculty operates a 350 acre field station near to St. Augustine which includes a dairy herd, and is closely associated with the Texaco Food Crops Farm. The Library holdings in Agriculture and the Sciences, which include extensive runs inherited from the Imperial College of Agriculture, is an important facility. The collection on tropical agriculture is considered to be one of the best in the world.

The Faculty of Agriculture offers the Bachelor of Science Degree in Agriculture and Postgraduate degrees of Master of Science and Doctor of Philosophy in Agriculture and Agricultural Economics.

The basic objective of the research programmes is to increase Regional food production by developing systems of crop and livestock production that are economically viable. There is collaboration with the local Ministries of Agriculture, particularly where research in extension methods, and adoption of new technology, are involved.

Outreach

The outreach activities of the Faculty are being increased. The Department of Agricultural Extension Studies works closely with the Caribbean Agricultural Research and Development Institute and other institutions to facilitate the flow of improved agricultural technology to small farmers.

Diploma in Agricultural Extension

A one-year diploma course in Agricultural Extension is planned to up-grade The skills and knowledge of extension personnel throughout the West Indies. This course will accept extension personnel with diplomas in Agriculture from the Jamaica School of Agriculture, the Guyana School of Agriculture and from the Eastern Caribbean Institute of Agriculture and Forestry. The course will enable extension personnel to improve their professional extension and communication skills and to advance professionally in their respective national systems.

In-service Staff Training

There is to be a significant expansion of in-service training to give extension workers new technical and professional skills consistent with the full-time educational role they will perform in the proposed re-organisation of national extension systems.

LINKS BETWEEN THE UNIVERSITY AND THE COMMUNITY

All Faculties are involved in some degree in outreach. Agricultural outreach was summarised previously; Engineering also provides extension programmes, and there are several institutes whose work consists largely of dealing with community problems. The Department of Extra-Mural Studies provides the largest single outreach effort.

DEPARTMENT OF EXTRA-MURAL STUDIES

This department:

- helps develop and maintain educational programmes appropriate to the needs of each particular territory;
- stimulates work in Adult Education and joins with other agencies in organising special adult education programmes;
- provides information on the University in each territory and fulfils a need for some University presence.

Organisation and Staffing

The Department is divided into three areas as follows:

1. Barbados
2. Trinidad and Tobago
3. Other contributing territories

Resident Tutors direct the work of the University Centres in their areas and perform certain liaison services.

As would be expected, the Extra-Mural programmes have developed their own special flavours at each location.

MONA

This campus has benefitted from the development of various specialised units, for example:

The Radio Education Unit

This unit produces two weekly half-hour radio programmes for broadcast in Jamaica. Tapes and transcripts of most programmes are available on request.

The Trade Union Education Institute

This Institute trains trade union delegates and others in a variety of relevant areas. The Institute maintains a good library including visual aids and a mobile unit.

The Human Resources Development Centre

The Centre aims at improving inter-personal relationships so as to increase productivity and to help cope with changes in the home and work environment.

The Social Welfare Training Centre

This Centre provides training for para-professional workers in a wide range of social welfare and community development oriented activities. University staff in various Departments and specialists from the Public Sector contribute to the training.

The organisation chart is shown in Figure 4.

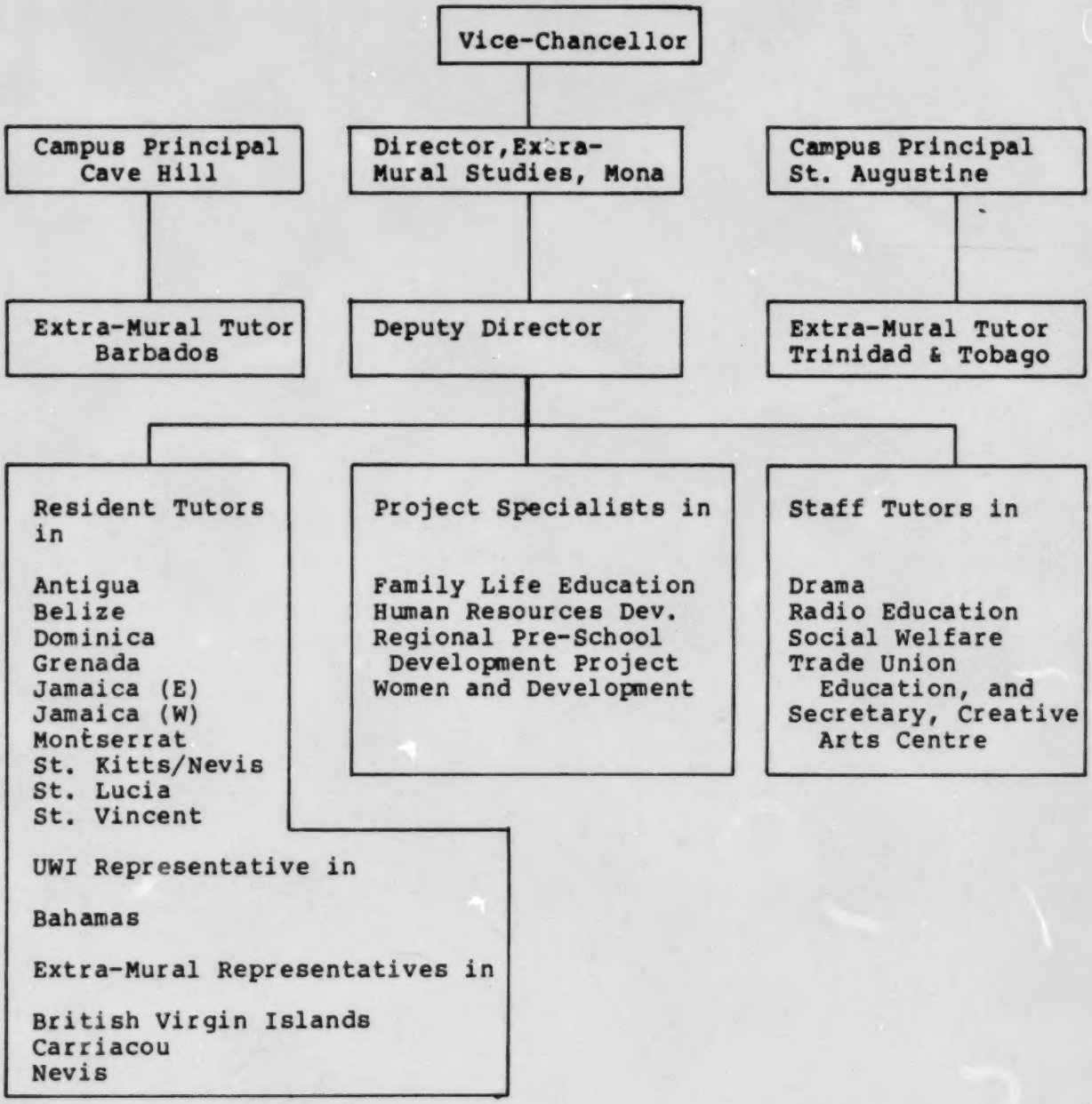

Figure 4: Organisation Chart for the Department of Extra-Mural Studies.

CAVE HILL

The Department of Extra-Mural Studies provides programmes for a wide range of special interest groups, viz: nurses, teachers, pharmacists, the police, youth clubs, secretaries, and youth farmers' groups.

A regular workshop/seminar programme includes topics such as Worker Particpation, Office Supervision, Drug Abuse, Teenage Pregnancy, the Structure of Government, and Preparation of Children for Adolescence. The Department serves also as a resource agent to a number of organisations.

Most of the activities depend largely upon local resources mobilized for the particular purpose, except for the following large special programme:

The Women and Development Unit

The Women and Development Unit (WAND), reinforces on-going efforts in the improvement of the social and economic status of women in the Caribbean.

WAND's skills and capabilities in training are available to other organisations.

ST. AUGUSTINE

The Department of Extra-Mural Studies at St. Augustine serves a wide variety of interests. The activities include:

A General Class Programme

This provides "O" level and "A" level teaching and non-examination courses in the Arts, Sciences and Humanities. Some job-oriented training is also done. There is a three-year certificate course for Teachers of Adults, conducted in co-operation with the University of Guyana, intended for:

- instructors in Teachers' Colleges, Community Colleges and Labour Colleges;
- lecturers in evening programmes of the Ministries of Education as well as the Department of Extra-Mural Studies itself;
- agricultural extension officers;
- probation officers;
- social welfare officers;
- communicators in the media, librarians, members

of the clergy, community development workers;

- literacy workers.

A Special Class Programme

This is directed at middle level skills of professional and para-professional bodies and covers subjects such as Business Management, Communication Arts, Allied Health Sciences, Medical Laboratory Technology and Post-certificate courses in Vector Control. The three-year course for Pharmacists is the regular training programme for that profession in Trinidad.

A Vocational Studies Programme

The potential beneficiaries of this programme are fourth and fifth form students who are weak in particular subjects. The programme also includes a social work project and a three-year certificate course for Teachers of Adults.

OTHER UNITS

Among the other units involved in outreach work are:

- The Tropical Metabolism Research Unit;
- The Institute of Social and Economic Research;
- The Epidemiological Research Unit;
- The Caribbean Food and Nutrition Institute;
- The Cocoa Research Unit.

JOINT BOARD OF TEACHER EDUCATION

The Joint Board of Teacher Education and the Eastern Caribbean Standing Conference of Teacher Education provide a special mechanism for interaction on educational matters between Governments and the University.

There is also an Advisory Council for Education which consists of representatives of all Ministers of Education of the supporting states together with Regional Teachers' Associations. The Council meets annually with officials of the University.

THE UNIVERSITY COUNCIL

The most important formal link is the University Council which sets the policy and operational framework within which the Regional institution performs. Council has exercised a great deal of influence on University development during the last decade through its Appraisal Committee.

Appraisal Committee

During the 1960's, the changing needs of the area led Council to establish an Appraisal Committee which consisted of the territorial representatives on Council, or their appointees, members of the Senate and student representatives. The Committee met periodically between 1963 and 1970. Numerous studies and detailed assessments of the University, its Faculties, Departments and Institutes were carried out and statements by territorial Governments were also invited and jointly examined. A survey of the nature, scope, and direction of expansion which each member country regarded as essential to meet its needs for University trained manpower, and to absorb the swelling outputs from Secondary Schools and other Institutions, was conducted and carefully assessed. Three working parties studied at first hand the needs and desires of the non-campus countries for education-based development. The reports and/or recommendations dealing with each territory were reported to Council in February 1970. A summary of those matters which are most relevant to this study follows.

The various expressed interests of the Non-Campus Territories grouped by the number of territories are:

All Territories (11)

- Teacher Training;
- Technical Education;
- Public Administration;
- Programmes leading to University-type qualifications; Degrees, Diplomas, Certificates, taught by UWI staff based in the territories;
- Courses qualifying for entry to employment in the Public and Private Sectors;
- Establishment of "circuits" of teachers for non-campus territories.

8 - 10 Territories

- Sub-professional training in Agriculture, Medicine and Engineering;
- Consultancy for Professional Faculties.

5 - 7 Territories

- Assistance with teaching to increase "O" level work;
- Business Administration and Management;
- Assistance with Sixth Form and "A" level work;
- Tourism and Management training therefor.

2 - 4 Territories

- Curriculum Development;
- Programmes leading to final Degrees of UWI;

- Fisheries;
- Forestry;
- First Year programmes for normal UWI Degrees;
- Food Technology;
- Agricultural Census;
- Physical Planning, Land Use and Conservation;
- Hotel Administration and Management at the higher levels;
- Social Work/Community Development;
- Information and Documentation Services.

1 Territory

- Archaeology;
- Research in Water Engineering;
- Low Cost Housing;
- Oceanography;
- English as a foreign language.

Territories were particularly anxious to have programmes leading to University type qualifications either in part or in full. There was also an interest in having a "recognised" college of UWI and some territories wished ultimately for a campus. Some territories suggested consideration of the establishment by UWI, in the particular territory, of a Regional facility not then available and a number suggested Hotel Administration and Management.

The working parties were fully aware of the importance of the various national aspirations, but were also fully conscious of certain difficulties associated with the need for some time to come to increase the output from secondary schools of persons qualified for entry to the "tertiary" education system and for entry to gainful employment. They were also aware of the problems such as staffing and the very high unit costs which would be associated with dispersed units of small size, and of the fact that the cost of local programmes would have to be compared with that of sending students to the campus.

The Report of the Appraisal Committee was considered by Council in 1970 when in summary the following actions were taken:

I. CAMPUSES, RECOGNISED OR AFFILIATED INSTITUTIONS BROAD INSTITUTIONAL ARRANGEMENTS

Council endorsed recommended principles which defined the characteristics of a Campus and the affiliation or recognition of other Colleges or Institutions, and allowed for opportunity of the attachment of University staff to such Institutions. It was also agreed that the University needed to be versatile in its approaches to institutional arrangements.

II. ARRANGEMENTS FOR NON-CAMPUS TERRITORIES

Of particular interest here are the agreements which referred to

programmes for extension services and continuing education, viz:

(a) Extension Studies for University of the West Indies qualifications.

That the Unversity could introduce a system whereby work towards University qualifications may be undertaken without attendance at a Campus. First and absolute priority was to be given at least for a three year period, to the needs of the non-campus territories.

Education, including Continuing Edcation.

The University would increase its efforts to assist the non-campus territories in a varierty of areas, including: curriculum development, increasing "O" level work and training programmes as laid out below:

Teacher Training

- Continued development of curricula and sylabuses for Teacher Training Colleges;
- The training of Secondary School Teachers (non-graduate and graduate) including in-service programmes;
- Continued re-appraisal by the Faculty of Education of the qualifications awarded, e.g. Certificate of Education and B.Ed.;
- Selection and training of Teachers of Teacher Training Colleges;
- Training of Teachers of the Deaf.

Technical Education

- Continued assistance with curricula and syllabuses and other planning for technical colleges;
- Advice on the form of Certification to be given by Technical Colleges;
- Training of Technical College Teachers - especially with slants towards West Indiean conditions;
- In-service Training.

Sub-Professional Training

Assistance with continuing education from the professional faculties of Agriculture, Engineering and Medicine, with training needs as indicated in individual reports, whether by special courses, or in-service programmes including seminars.

Public Administration

- Intensification of in-service training programmes to include visits of personnel for longer periods in the territories;
- Assistance in selection and training of Government Training Officers.

Business Administration and Management

- Provision of periodic courses;
- Seminars, etc., within the territories;
- Assistance with Accountancy.

Social Work and Community Development

Assistance with organisation and in-service training of Government and voluntary workers.

Adult Education

Assistance with the organisation of the various types of Adult Education.

(c) Other Extension Services - Consultancy and Research Programmes

The Faculties were asked to increase their efforts to satisfy identified needs for consultancy and research and to place faculty and postgraduate students in research work in the field in the LDCs for longer periods where possible. Food Technology, Food Processing and Marketing, and Agricultural Censuses were areas particularly identified for early attention.

(d) Information and Documentation Services.

The University of the West Indies was asked to establish a central Documentation Service or liaise with others, to provide information throughout the region on its research programmes and extension services.

It was clear that the University had a great deal to offer to the development of the Region and that the Region was indeed demanding more from the University. Most of the above matters were not at all novel - the University had been providing the services at some level for a long time - but that level was now to be increased. One new concept was Extension Studies.

EXTENSION STUDIES

Council's agreement in 1970 to the introduction of an External

Studies programme, was contingent on, inter alia, the availability of funds and the demonstration of an adequate likely enrolment. As it turned out, it was not possible to obtain funding and the scheme, which would have depended on correspondence type courses, never got off the ground.

A summary of some of the efforts made is to be found in a publication of the Development and Planning Unit.* As far as the technology goes, this report is, of course, dated, but the final section is worth quoting extensively as it is an excellent summary of the University's thinking at that time, and, with some slight changes, is as relevant today as it was then.

"EXTRA-MURAL AND EXTENSION WORK: A PLAN FOR THE DEVELOPMENT OF A UNIVERSITY OF THE WEST INDIES OPEN CAMPUS"

A. THE NEED FOR REORGANISATION:

It then appeared appropriate to make a clear distinction between three necessary tasks of off-campus University activities. These are:

(a) Extra-Mural Studies: programmes of "in-service" training and community service as well as programmes designed to stimulate and further work in Creative Arts;

(b) Extension Studies: programmes for extending teaching for credits towards a degree of the University of the West Indies;

(c) Extension Services: assistance through consultation, research into local problems and the supplying of information.

The first of these tasks represents the traditional function of the Extra-Mural Department. The others have not been the responsibility of the Extra-Mural Department though some extension work has been carried out by different sections of the University sometimes with the assistance of the Extra-Mural Department.

B. EXTRA-MURAL STUDIES:

The Extra-Mural Department provides continuing education, not necessarily for credit towards a degree, though some sort of accreditation would be an incentive. The work has been most effective in the area of "in-service" training, e.g. in social work, public administration, training prison wardens and policemen, etc. The Creative Arts is another field in which the Extra-Mural Department has been extremely effective. The Department has also achieved success in

*Report on Educational Technology and External Studies (August,1970)

developing training programmes for groups with special needs and also assists trained personnel to keep abreast of new developments in their disciplines.

These were not seen as work for an External or Extension Studies programme and it was recommended that the Extra-Mural Department should be preserved to carry on its present and similar programmes.

C. THE OPEN CAMPUS:

The University could not cope with the scale of operations which would satisfy the territories' needs without the aid of a special agency created for this purpose. A structure was suggested to incorporate the present Extra-Mural Department and the new tasks of extension teaching and providing extension services. A concept of a fourth campus to be named the "OPEN CAMPUS" was put forward. This Open Campus would serve all the non-campus territories. Responsibility for this work would ideally be assigned to a Pro-Vice-Chancellor with the following organisation:

(a) Extra-Mural Studies: The work corresponding to the existing Extra-Mural Studies would be headed by a Director responsible to the Pro-Vice-Chancellor (Open Campus). There would be a Deputy Director responsible for the programme in an appropriate section of the region. Either the Director or his Deputy should be a specialist in Adult Education.

(b) Extension Studies: Teaching for credit towards a University degree represents a tremendous undertaking requiring new approaches in teaching methods and expertise in educational technology. A Department of Extension Studies is proposed under the headship of a Director responsible to the Pro-Vice-Chancellor (Open Campus). It may be necessary for the Director of Extension Studies to have his headquarters at a campus in the Eastern Caribbean and be assisted in the Western Caribbean by a Deputy Director stationed at Mona. The functions of the Director of Extension Studies and/or his Deputy would have included; organising the academic work of the programme including the identification of part-time academic resources in the region, and also developing correspondence courses with assistance from academic colleagues and the use of educational technology to supplement academic courses.

(c) Extension Services: Functions such as consultation, research into local problems, the provision of information though distinct and important, will not require as elaborate machinery as shown for Extra-Mural and Extension Studies.

The following possibilities of staff attachments were envisaged:

1. University full time academic personnel based in a territorial institution;

2. University full-time academic personnel moving in circuits over a prescribed area and keeping in touch with a campus;

3. Campus based academic personnel visiting "off-campus" areas; and

4. University part-time academic personnel recruited in a particular territory.

Teaching would be supported by modern educational technology, e.g. closed circuit television, video tapes, films, etc. and the special place of Summer Schools in Extension studies teaching was recognised.

OPEN CAMPUS

A possible organisation chart for and "OPEN CAMPUS" is in Figure 5.

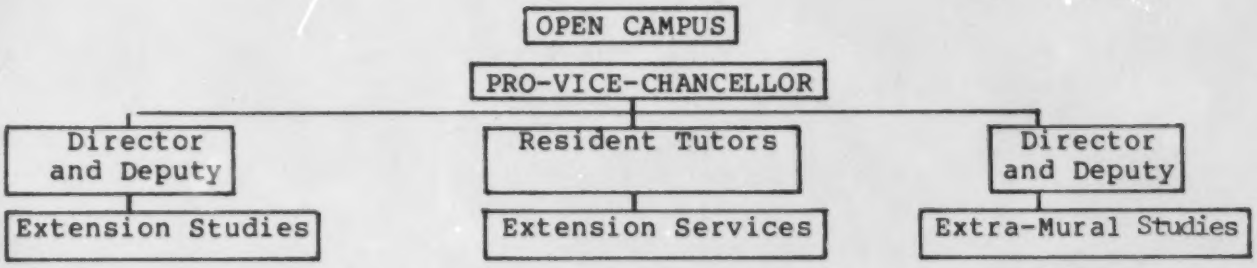

Figure 5: Organisation Chart of Open Campus.

A plan for the phased development of Off-Campus University teaching is in Appendix 1.

POST APPRAISAL DEVELOPMENTS

Despite severe financial stringencies, there was significant University development during the 1970's. Student numbers increased from 4,600 to nearly 9,000. The Faculty of Law began operations, there were expansions in all faculties, and by the end of the decade very substantial improvements in infrastructure had been and are still being made.

In medicine, full clinical programmes have been established in Trinidad and Tobago and in Barbados, and significant developments have been initiated in primary health care programmes. A new medical curriculum has been put in place and consequently, new importance has been placed on the use of audio-visual aids.

The establishment of a new Medical School in Trinidad is now in progress. Medical research has gone from strength to strength and the University is now renowned for its work, for example, in metabolism, human nutrition and haemoglobinopathies.

The School of Education has introduced a one year in-service Diploma in Education Certificate Course for Teachers of the Deaf, and has been assisting in monitoring the B.Ed. programme taught in the College of the Bahamas. The School has been much involved in the establishment and work of the Caribbean Examination Council.

There have been extensive developments in Agriculture. Student numbers have been increased, research programmes have been strengthened and the Department of Agricultural Extension has been consolidated and strengthened.

Developments in the arts based faculties include:

a) a new Management Studies Degree with concentration in Hotel Management, sited in Nassau, Bahamas;

b) the inception of the Institute of Mass Communications which trains media workers in radio, television and print;

c) the Library Studies programme;

d) Challenge Examinations (see later);

e) expansion of the work of the Institute of Social Economic Research.

An "Accreditation Committee" has been set up to facilitate the admission of students from other institutions with appropriate credits.

Increasing emphasis has been placed on outreach and the development of outreach capabilities. These have been strengthened through special programmes of training, research and expansion - made possible by soft loans and grants which have also improved infrastructure and support services such as libraries, media production, electronics maintenance and learning centres, and major items of scientific equipment have been obtained. Information retrieval has been introduced and a data bank is being set up.

There are numerous research programmes dealing with the Region's natural resources, energy studies, rural infrastructure, marine biology, food production and a host of other topics.

Many of the recommendations of the Appraisal Committee have actually fructified, but not Extension Studies. It may be that during this decade, telecommunications techniques may make these programmes feasible. The recently introduced Challenge Examination appears to be an important initial step towards Extension Studies.

CHALLENGE EXAMINATIONS

To share fully in the benefits of the Regional instution, the LDCs must be able to participate fully in the University's programmes at all levels including Higher Degrees and to utilize the relevant knowledge which flows from its researches. But as shown in Table 6, the number of students admitted from the LDCs during the 1970's has been decreasing and the number admitted into all courses in 1978/79 was but 58 percent of admissions in 1971/72.

Table 6: Annual Student Admissions from LDCs 1971-80

Year	First Degrees	Certs. and Diplomas	Higher Degrees	Total
1971/72	178	44	14	236
1972/73	168	30	11	209
1973/74	144	29	18	191
1974/75	100	36	11	147
1975/76	105	56	12	173
1976/77	115	38	10	163
1977/78	80	34	7	121
1978/79	94	34	11	139
1979/80	87	25	9	121

One reason for this decline is cost inflation. The Unversity has been obtaining funds for scholarships, etc., to help arrest this gloomy trend, but this effort seems unlikely to provide the full solution and other avenues are being explored. One of these is the Challenge Examinations.

The Challenge Examination Scheme offers an opportunity for candidates to sit the first year examinations for certain degrees in their own territories. This allows the completion of the first part of certain programmes without incurring the maintenance, tuition and economic costs of attending on campus.

In recognition of the actual and potential value of the scheme, it was recently agreed that some University funds (approximately J$70,000) would be allocated to provide some support. Various proposals for supporting the Challenge Examination effort have been made, viz:

- preparation of lectures for taping;
- provision of cassette players;
- provision of additional books for University centre libraries;
- liaison of Extra-Mural Tutors with campus tutors;
- visits by campus staff to work with local tutors to provide intensive preparation for those who are taking Supplementals in September;
- a designated co-ordinator on each campus;
- the offer of additional subjects by the Faculty of Arts and General Studies;
- strengthening of the Cave Hill Library to provide supervision of Extra-Mural Libraries in the Leeward and Windward Islands.

Arrangements for Challenge Examinations

Challenge Examination candidates require the normal qualifications for University entry. Normally, not more than two subjects are examined in the first year. Candidates must qualify for entry to Part II in not less than two year nor more than four years. Lectures are not provided, but increasingly, tutorial programmes are being arranged by Resident Tutors.

The Programme

The system is presently operated in nine non-campus territories. The Mona Campus administers the activities in Jamaica, Bahamas, Belize and St. Kitts; The Cave Hill Campus administers Dominica, Antigua and Montserrat; while Grenada, St. Lucia and St. Vincent are administered from St. Augustine. The Scheme is administered by the Faculty of Social Sciences. It now serves the Part I of all Social Sciences Degrees and certain Degrees in Arts and General Studies which involve combinations of History, English and Social Science subjects.

Statistics and Preliminary Evaluation

As shown in Tables 7 and 8, there is no lack of applicants and a significant percentage of these actually sit the examination.

Table 7: Registration Status of Challenge Examination Students

Year of Entry	1977/78	1978/79	1979/80
Applicants	109	87	91
Places offered	64	76	83
Admissions	62	63	83
Registrations	62	96	121
Withdrawals	28	63	66
Exam. Candidates	34	33	55

Table 8: Number of Challenge Candidates from non-campus Territories

	1977/78	1978/79	1979/80
Antigua	10	14	22
Bahamas	8	5	6
Belize	6	7	7
Dominica	10	14	0
Grenada	8	11	6
Montserrat	1	6	12
St. Kitts/Nevis	-	19	27
St. Lucia	10	13	30
St. Vincent	9	7	11
Total	62	96	121

Given that students prepare largely on their own, the results shown in Table 9, are reasonably good.

Table 9: Number of Papers Sat and Passed in Non-Campus Territories Analysed by Year of Examination

Year of Examination	1977/78	1978/79	1979/80
No. of Candidates	34	33	55
No. taking 1 Subject	4	17	35
No. taking 2 Subjects	30	16	20
No. taking 3 Subjects	-	-	-
Total No. of Papers Written	64	49	75
Overall Pass Rate (Percent)	45	59	41

Beginning in 1979/80, Jamaican students are being allowed to enter the Challenge Examination Scheme. Table 10 gives the results for that year.

Table 10: Analysis of No. of Papers Sat and Passed in Jamaica in 1979/80

No. of Candidates	19
No. taking 1 Subject	2
No. taking 2 Subjects	13
No. taking 3 Subjects	4
Total No. of Papers Written	40
Overall Pass Rate (Percent)	75

The results are promising, particularly in view of:

1. the minimal level of teaching support;
2. the inadequacy of the University Centre Libraries in books and periodicals for programmes at this level.

Distance Teaching and the Challenge Scheme

Because the Challenge Examination System is a practical step towards an Extension System, because some of the system is already in place and because it has won a measure of acceptance with the Governments within the University and among candidates, it merits consideration as the core of a University of the West Indies Extension System.

A survey of the UWI Resident Tutors revealed a great deal of interest in using distance education techniques. Seven of the nine Resident Tutors from territories using Challenge Examinations responded, and were unanimous that distance eduation would be warmly accepted, particularly if an interactive system were used.

CHAPTER FIVE

AGRICULTURE AND HEALTH IN THE CARIBBEAN

AGRICULTURE*

Agriculture is a major economic activity throughout the Commonwealth Caribbean. In the territories served by the University, it accounts for 3 to 37 percent of the Gross Domestic Product, provides for a very significant proportion of the population and occupies much of the land area. Table 11 emphasises just how important agriculture is to the Region.

Table 11: Distribution of Population and Land Area by Territory.

Country	Percentage employed in Agriculture	Total Land Area Sq.Mls.	Area of Arable Land Sq.Mls.	Density Persons/ Sq.Mls.
Antigua	10.6	171	44	423
Bahamas		5,380	62	43
Barbados	+10	166	141	1,506
Belize	+35.8	8,867	273	16
British Virgin Islands	7.8	59	8	178
Cayman Islands	4.1	100		150
Dominica	39.5	290	73	264
Grenada	33.3	133	66	790
Jamaica	35.4	4,411	1,719	484
Montserrat	20.3	39	8	325
St. Kitts/Nevis	34.2	103	59	482
St. Lucia	39.7	238	117	462
St. Vincent	29.0	150	73	687
Trinidad & Tobago	13	1,980	656	572

Several territories depend on the export of such crops as sugar, bananas, coffee, citrus and various spices. A whole range of fruits, root crops, rice, etc. is also produced for local consumption, but the agricultural balance of trade is unfavourable because of the high import bill for food and animal products.

*This section is based on a report "Alternative Communication Technology to Serve Agricultural Extension and Development in the West Indies" by Burton E. Swanson and Raymond A. Woodis, under a contract between the University of the West Indies and the Academy for Educational Development.

The diversity of crops is a reflection of the ecological diversity of the Region. Rainfall patterns, for example, differ substantially even within some islands; soil types include say the Pine Ridge soils in Belize, the shale soils of central Jamaica, the calcareous soils of Antigua and Barbados, the volcanic soils of the Windward and other Leeward Islands and the heavy clay soils of Trinidad and Tobago.

Consequently, the Caribbean farming system is very complex and a good extension service is vital, particularly to assist the small farmer group, which is playing an increasingly important role in the production of food and export crops. Farmers have limited access to technical information and the modern inputs which could increase agricultural production and farm family incomes.

In recent years the high cost of labour, inflation and fluctuating world prices, have reduced the profitability of large scale production of many of the traditional export crops. During this time, small farmers have increased their output in both food and export crops and will need to shift to more productive agricultural technologies. Enabling farmers to make this shift will require an expansion of supporting services, including extension.

National Agricultural Extension Systems in the West Indies

The national extension systems are virtually the only links between the small farmers and the world of technology, credit, inputs, services, etc. The investments presently being made in agricultural research, marketing and planning will generate new technology and information for transmission to farmers so that extension work will become even more important.

Size and Structure of National Extension Systems

An agricultural extension system is essentially an organisation for information and technology transfer to the farmers. Therefore, the size and quality of the staff resource is a very important factor determining its effectiveness.

Table 12 summarises the available data on extension personnel for each national system. The extension worker/farmer ratio, ranges from about 1 to 250 in many territories to about 1 to 750 in St. Lucia. At first sight these ratios look quite good, but in fact, most extension agents are not in the field working with farmers on a regular basis.

Table 12: Size and Structure of National Extension Systems.

Country	Admin. and Supervisory Personnel	Technical Specialist	Field Extension Workers	Total Personnel
Antigua	3	1	10	14
Bahamas	2	12	15	29
Barbados	3	3	5	11
Belize	7	n.a	28	35
Dominica	5	4	17	26
Grenada	5	9	16	30
Montserrat	2	3	5	10
St. Kitts/Nevis	1	1	3	5
St. Lucia	8	2	19	29
St. Vincent	5	9	10	24
Trinidad & Tobago	39	11	52	102

Quality of Extension Personnel

Assessing the quality of personnel is usually an imprecise task, but some indication is given by educational qualifications. Some of these are shown in Table 13 for 1974 for extension staff. About half of the degree or diploma holders obtained the qualification after joining a national extension system.

Table 13: Formal Educational Qualifications of Extension Personnel.

Country	None	Agriculture School Diploma	Degree	Total
Antigua	8	5	1	14
Barbados	-	9	2	11
Dominica	14	10	2	26
Grenada	12	17	1	30
Montserrat	4	5	1	10
St. Kitts/Nevis	2	3	-	5
St. Lucia	n.a.	n.a.	n.a.	29
St. Vincent	6	15	3	24
Trinidad & Tobago	13	72	17	102

At the time the survey was done only 60 per cent had received additional technical training to upgrade their technical skills and knowledge, and about 44 percent had received no training in extension methods and techniques, either as part of their pre-service or in-service training.

Extension Methods and Communication Skills Used by Extension Personnel

A variety of extension methods and skills are regularly used. These include:

(a) mass media, i.e. newspapers and radio;

(b) group extension methods, including the use of films;

(c) small group or individual programmes. These are likely to become more important as the target audience changes more and more towards the small farmer.

Effective extension work requires proficiency in both subject matter and extension methods. Tables 14 and 15 contain the results of sample surveys of perceived training needs. Obviously there is a high perceived demand for both technical extension methods training; and some 75 percent of all extension personnel in the Region see the need for additional training.

Most extension personnel are regularly receiving technical publications, but technical publications are not a total answer; over 80 percent of the extension agents perceive the need for more direct help from specialists to diagnose and solve immediate problems as shown by the results of a survey summarised in Table 14.

Table 14: Technical Support for Extension Personnel.

Country	Regular receipt of Technical Publications		Perceived need for more help from Technical Specialists	
	Percent	No.	Percent	No.
Antigua	64	9	100	14
Barbados	91	10	82	9
Dominica	88	23	92	24
Grenada	77	23	80	24
Montserrat	100	10	80	8
St. Kitts/Nevis	60	3	100	5
St. Lucia	79	23	83	24
St. Vincent	63	15	54	13
Trinidad & Tobago	69	79	81	83
All	74	186	81	204

Table 15: Percentage of Extension Personnel Perceiving a Need for Additional Training in Technical Subject Matter and Extension Methods.

Country	Desiring more Technical Subject Matter		Desiring more Extension Methods	
	Percent	No.	Percent	No.
Antigua	100	14	100	14
Barbados	73	8	73	8
Dominica	65	17	92	24
Grenada	77	23	80	24
Montserrat	60	6	80	8
St. Kitts/Nevis	100	5	100	5
St. Lucia	62	18	83	24
St. Vincent	50	12	67	16
Trinidad & Tobago	71	72	75	76
All	70	175	79	199

REGIONAL INSTITUTIONS SERVING THE AGRICULTURAL SECTOR

Many inputs are required for agricultural development and there is already in place a number of Regional institutions which play or can play a major role. Brief descriptions of these are presented in this section. The Faculty of Agriculture was described earlier.

CARDATS

This is a Regional agricultural development and training project funded by the United Nations Development Programme and administered by the Food and Agricultural Organisation. CARDATS currently serves the Windward and Leeward Islands.

Caribbean Development Bank (CBD)

The CDB is expected to provide a substantial part of the loan component for financing of projects in the Regional Food Plan of the CARICOM countries. The CDB also provides short-term production credit to farmers in the Region and has established an Information Unit. It is also exploring ways of improving its own internal communications for improved programme co-ordination and administration.

Caribbean Food Corporation (CFC)

This is expected to be the central agency with responsibility for the implementation of the Food Plan which attempts to integrate the various Regional organisations into a well organised and co-ordinated

effort to increase food production.

Caribbean Investment Corporation (CIC)

CIC is responsible for promoting industrial development, including the development of agro-based industries and of integrated agricultural and industrial complexes in the LDCs.

Caribbean Food and Nutrition Institute (CFNI)

CFNI assists member states by collecting, analysing and interpreting data on the food and nutrition situation, and advising Governments on food and nutrition policy.

Caribbean Industrial Research Institute (CARIRI)

CARIRI is financed solely by the Trinidad and Tobago Government, but is available to carry out research and development in relevant agro-industry for the CARICOM Region.

The Caribbean Agriclutral Research and Development Institute (CARDI)

CARDI's primary role is to develop and test improved agricultural technology appropriate to Caribbean conditions.

CARDI presently mounts commodity research programmes to identify the most productive crop varieties and the optimal production Regimes paying full attention to "location specificity", and aims at integrating the research output into the actual farming systems.

CARDI is decentralizing its scientific staff throughout the Region to be more responsive to the national programmes. Given the difficulty and cost of inter-Regional communication, travel and considerable internal operations, there will be attendant problems. Approaches to solving these problems, include an internal staff news letter and telex communication links.

CARDI has also established an Information Unit in Barbados to:

- provide information about its work;
- bridge information gaps in all aspects of agriculture;
- assist other institutions (preferably Ministries of Agriculture) to establish and operate their communications divisions.

HEALTH*

*This section owes much to reports prepared by Professors G.A. Alleyne and K.L. Standard and Dr. H.A. Drayton.

The health policies of the Caribbean territories reflect trends in health policy worldwide. Over the past 25 years, three important concepts have gained acceptance:

(1) health is a component of economic and social development;

(2) improved health reflects the social changes which have occured; and

(3) the "basic needs" approach to health policy and the planning of health policy; the aim is to improve health and not just to provide health services.

Because of the generally clear appreciation of the problems in health care delivery, the majority of the developing countries have opted for the primary care approach as being the one as most likely to provide an acceptable situation. A major step in improving health care in the Caribbean is the establishment of systems which tackle the following:

- selection of the broad choices, approaches and priorities;
- the problem of resources;
- problems of the general structure of the health services;
- technical weaknesses in health, education, communications, transport and information;
- distribution of skills.

The Caribbean Situation*

Interaction between the territories on the health problems of the region is achieved by a CARICOM institution - "Meetings of Ministers Responsible for Health". The Ministers of Health have identified the major health problems of the Region as:

- Poor environmental conditions and the resulting communicable diseases, namely, gastroenteritis, dysentery and typhoid. In addition, cholera remains a threat.

*The statistical data were collected from the Chief Medical Officers' reports for the various territories, but where they were incomplete, additional information was collected from regional publications dealing with health.

- The dangers in the environment - insufficient and unsafe water supplies, insanitary excreta disposal and poor food hygiene.

- The high rates of sickness and death in the mothers and children who make up 65 percent of the whole population. The inadequacy of services such as family planning.

- Combined malnutrition and diarrhoeal disease in children under two years of age which accounts for most of the deaths in this young age group, and also of one-fifth to one-third of deaths for all ages.

- Communicable diseases which cause 20 to 30 percent of all deaths in the Caribbean Community. One-third of these deaths are due to diseases that could easily be prevented by immunisation.

- The sexually transmitted diseases which are on the increase.

- Tuberculosis, which is also on the increase.

- Diabetes and high blood pressure which are often undetected and uncontrolled until they give rise to grave complications that strike down adults at the height of their productive capacities.

- Mental illness which constitutes about one-half of the total volume of illnesses. The mental health services are sadly deficient. Drug abuse falls under this heading; in the Caribbean Community, the most important drug problems are alcohol and tobacco smoking.

- Diseases of the teeth and gums.

- The mosquito which transmits yellow fever and dengue in populated areas. The yellow fever virus is found in the forests of Guyana and Trinidad and in nearly all South American countries. It could at any time spread throughout the Caribbean Community.

- The lack of knowledge and of a sense of responsibility for participation in community health. The lack of programmes in health education which would remedy this state of affairs.

- Serious weaknesses in the management of the health services, in the availability of trained staff and in the supply and maintenance of health care facilities.

HEALTH FACILITIES AND RESOURCES

Organisation of Health Services

Throughout the Caribbean there are no private organisations which can compete with the Governments in the diagnostic and therapeutic facilities provided. In some territories, Health is a single portfolio, but in others, portfolios are combined. This is particularly true in the smaller territories, where there are small numbers of Ministers.

The Minister provides policy direction. The Permanent Secretary, a Civil Servant, directs the administrative and financial affairs of the Ministry . The technical advisors to the Permanent Secretary include the Chief Medical Officer who is usually responsible for the administrative structure. Figure 6 is a typical, but abbreviated organisation chart.

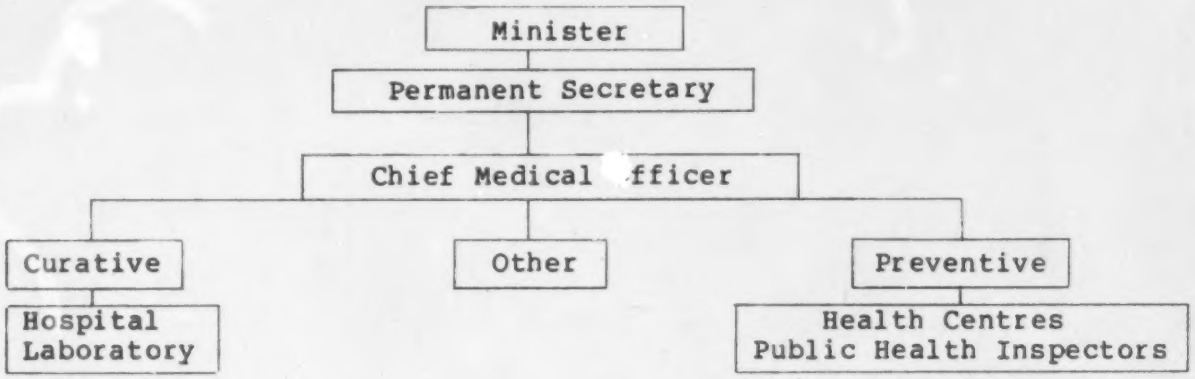

Figure 6: A Typical Organisational Chart for Caribbean Health Services.

The Chief Medical Officer is responsible for the environmental and health services and all the medical care services. These last include all the curative, preventive and promotional services. The curative services include hospital and laboratory operations, which generally account for approximately 50 to 75 percent of the budget. Preventive services are provided by Public Health Nurses and periodically by doctors. Major hospital facilities are located in urban centres with the health centres scattered throughout the islands to provide more accessible health care. Activities in the centres may include clinics for antenatal care, child welfare, hypertension and diabetes, family welfare and immunization clinics as well as primary care for minor ailments and injuries. Another important element of the preventive services is the Public Health Inspectors who are responsible for the broad area of environmental sanitation.

Support systems - maintenance, supplies, laboratories - tend to be either weak or in some cases, non-existent.*

Types of Health Facilities

The available data are shown in Table 16.

Table 16: Caribbean Health Facilities.

Country	Hospitals	Poly-Clinics	Health Centres	Clinics
Antigua	6	-	5	19
Barbados	12	5	6	10
Dominica	4	-	5	40
Jamaica	35	2	142	232
St. Kitts/Nevis	6	-	-	20
St. Lucia	6	-	-	24
Montserrat	1	-	3	9
Trinidad & Tobago	13	-	102	-

N.B. In some territories it has been impossible to separate accurately the health centres from the clinics.

In general there is a broad division into institution curative services and ambulatory services. The notion of poly-clinics is a new one and has been advanced furthest in Barbados although the Jamaican health care plan lays out in greater detail the ideal organisation of clinics into various types.

If this programme is eventually implemented in full, there will be a wide range of clinics of varying degrees of sophistication staffed with health professionals at different levels of skill and training. It is envisaged in Barbados that the poly-clinics will be well staffed and offer a wide range of curative and public health services. This will relieve much of the pressure on the out-patient services of the general hospitals. In Jamaica, the large number of hospitals possibly indicates that some of them at present discharge some of the functions envisaged for the poly-clinics. In all territories, the basic idea is to have at least one well equipped tertiary care institution which does not undertake the continuing ambulatory care of a large number of patients.

All the Caribbean territories have at least one general hospital. There is also provision of psychiatric hospital care either through a special hospital, or as in the smaller territories, by having psychiatric beds in general hospitals. The variation in sophistication of the hospitals is considerable. In Jamaica, for example, there are three very large "Regional" hospitals: the University Hospital of the West Indies, the Kingston Public Hospital

*Aid Report of the Caribbean Health Survey Team, October, 1977, p.9.

and the Cornwall Regional Hospital. At these hospitals, a wide range of speciality services is available. The "district" hospitals in Jamaica provide a narrower range of specialities. Other hospitals in Jamaica are the National Chest Hospital, the Mona Rehabilitation Centre and the Hope Institute for terminal cancer care. It is probable however, that some of the district hospitals in Jamaica can be equated with the acute General Hospitals of the smaller territories in terms of the facilities, although the number of specialists available is likely to be higher in the smaller territories.

There are limited data on the types of diagnostic facilities available in the hospitals of the Region. In Jamaica, for example the district hospitals will each have very basic X-ray and laboratory facilities; special tests are referred to the laboratories of the larger hospitals. In the Non-Campus Countries a great deal of effort has been put into the upgrading of the laboratory facilities especially in the areas of diagnostic microbiology. This has been done mainly by provision of training through the Allied Health Project in Barbados and the supervision and back-up provided by the Caribbean Epidemiology Centre - but the range of diagnostic support which can be given is often limited. This has implications for the use of telemedicine as will be discussed below.

Human Resources

The numbers of selected medical personnel and the ratios per unit of population are shown in Table 17. There is again a wide variation in the availability of physicians and nurses and in addition, there is mal-distribution through some of the territories. In Jamaica, for example, in 1974, whereas the ratio of physicians per 10,000 popultion was 6.4 in the urban areas, it was 1.4 in the rural areas.

Table 17: Medical Human Resources.

Country	Year	Doctors	Dentists	Reg. Nurses
Antigua	1978	26 (3.55)	3 (.41)	83 (11.35)
Barbados	1979	201 (7.9)	24 (. 9)	569 (22.4)
Dominica	1980	16 (1.9)	1 (. 1)	157 (18.6)
Jamaica	1979	716 (3.41)	87 (.41)	2,124 (10.1)
St. Kitts/Nevis	1976	13 (2.7)	6 (1.2)	132 (27.2)
St. Lucia	1978	32 (2.9)	5 (. 5)	195 (15.7)
Trinidad & Tobago	1978	780 (6.89)	70 (.61)	1,840 (16.2)

Figures in brackets refer to ratio per 10,000 population.

In 1976 the average ratio per 10,000 population for physicians in North America was 16.4, Middle America 6.0 and South America 8.0. In the case of nurses, the ratio for North America in 1976 was 46.4, Middle America 5.4 and South America 2.4 The ratios for the Caribbean are substantially greater than those for Middle and South America. The ratios for Dentists for the regions of the Americas given above are 5.1, 1.1 and 3.1. This is clearly the area in which the Region as a whole is most deficient.

It is this shortage of skilled personnel and the inadequate ratio between professionals and supporting staff that prompted several of the territories to begin the training of other types of health workers. In 1967, Professor K.L. Standard, began training Community Health Aides in Jamaica to work as auxiliaries in a health team under the supervision of established professionals. The training of Nurse Practitioners began in Jamaica in 1978. In Guyana the training of Dental Nurses, Community Health workers and MEDEX workers has been started. The MEDEX is being trained to diagnose and manage certain specific common ailments, to promote health and to prevent disease, to provide midwifery and dental hygiene services and simple dental procedures. The acceptance of some type of auxiliary physician in most of the territories (Barbados and Trinidad and Tobago are the notable exceptions) has implications for any telecommunications programme.

Another aspect of the human resources is the variety which is available. The range of specialty services available in Jamaica and Trinidad & Tobago is shown in Table 18. Most of these are available also in Barbados.

Table 18: Specialty Services in the Acute General Hospitals in Jamaica and Trinidad and Tobago.

General Medical	Dermatological	Psychiatric
General Surgical	Cardiovascular	Neurological
Paediatric	Ear, Nose & Throat	Neurosurgical
Gynaecological	Ophthalmological	Physiotherapeutic
Orthopaedic	Dental	Renal
Paediatric & Reconstructive	Gastroenterological	Radiological
Endocrinological		
Pathological		

In smaller territories there is much less expertise available and it is not unusual to find one surgeon performing a wide range of general surgical, orthopaedic, gynaecological, ear, nose and throat and other procedures.

Indices of Health Status

Some indices of health status are shown in Table 19. There has in general been steady improvement in all these indices and the crude death rate in most of the territories is very similar to those found in North America. The life expectancy in the larger territories is approaching that found in North America.

Table 19: Birth and Death rate per thousand of Population.

Country	Year	Birth Rate	Death Rate
Antigua	1978	18.3	5.5
Barbados	1979	16.9	8.4
Dominica	1978	21.3	5.1
Jamaica	1978	27.3	5.9
Montserrat	1978	17.1	13.1
St. Kitts/Nevis	1977	24.8	10.3
St. Lucia	1978	35.1	7.2
Trinidad & Tobago	1978	25.3	6.6

Child and Mother

If attention is focused merely on life expectancy figures, on crude death rates, and on patterns of morbidity and mortality for all age groups, the overall Health status of the people of the Region might appear to give little cause for concern. Certainly the prevailing picture is vastly improved since the 1940's and is very dissimilar from that in many countries in Africa, South-East Asia and Latin America. If, however, we consider the health problems of mothers and children below the age of fifteen (who comprise no lesss than 65 percent of the total population) there can be little room for complacency.

Morbidity and mortality rates among this vulnerable segment have been significantly reduced especially over the last decade. Nevertheless, inadequate coverage of the health services and under-emphasis, both of health promotion and on the use of preventive techniques of proven efficacy, still contribute annually to a considerable amount of preventable illnesses - infectious diseases, respiratory ailments, and accidents.

Table 20 gives data on the infantile mortality rates, death rates (most recent figures available in each case) are detailed.

Table 20 : Health Statistics on Mothers and Children.

Country	Infant Mortality Rate (per 1,000 live births)	Death Rate 1-4 years (per 1,000 population)	Maternal* Mortality Rate (per 1,000 live births)
Antigua	22	1.0	14.7
Belize	39	3.1	3.8
B.V.I.	17.8	0.8	40.8
Cayman Islands	17.9	0.8	35.7
Dominica	21.5	1.5	3.9
Grenada	16.7	1.4	3.5
Jamaica	26.3	4.6	10.6
Montserrat	58.5	1.5	N/A
St.Kitts/Nevis	42.1	1.3	36.4
St.Lucia	27.8	1.5	4.8
St.Vincent	64.4	4.9	5.9
Turks and Caicos	24	N/A	53.8

Women in the reproductive age group (15-44 years) towards whom MCH services are traditionally directed, comprise approximately 20 percent of the total population in the countries of the Region. There is every indication that within the next decade the number of persons in this group will increase substantially, and this will almost certainly generate both an increase in the number of births and in the demand for MCH services.

Despite the fact that infantile mortality rates in the majority of the Commonwealth Caribbean countries would appear to be below 50 per 1,000 live births, the accuracy of some of the data is suspected; and there are still areas in many of the countries where the rates are certainly much higher than the national recorded "average". Perinatal and neonatal mortality are continuing problems.

By far, the greatest causes of sickness and death in the Region, among children under the age of 5, are gastroenteritis, respiratory diseases and malnutrition. More than 50 percent of all children in the Commonwealth Caribbean, 5 years of age or less, suffer from some degree of protein calorie malnutrition. The Childhood Malnutrition Index (CMI) - measured in terms of the percentage of children under 5

*Note "...since the population in (many of) the individual territories is small and maternal death rates are (generally) relatively low, they are not considered sufficiently sensitive to assess maternal health status in the Caribbean. More consideration needs to be given to problems related to maternal morbidity" MCH Strategy for the Caribbean Community: PAHO/WHO Scientific Publication No. 325, 1976.

years of age weighing less than 75 percent of the age specific "standard weight" is 14 times greater in the so-called LDCs of the Region than in Sweden. The CMI is probably only slightly lower among the MDCs of the Caribbean. The incidence of iron deficiency anaemias is also high, among mothers and children.

Among children of school age in many of the countries in the Region, the incidence of parasitic infections is high, e.g. in St. Kitts/Nevis, it was reported in 1978 that 40 percent of the school children between 5 and 7 years of age, and 20 percent between 7 and 9 years, were infected with parasitic worms. In Belize helminthiasis, and fungal skin infections are listed among the major child health problems in the age group 6 weeks to 14 years.

Allied Health Training

As long ago as 1969, when the Ministers met for their very first annual conference, the acute shortage of trained Allied Health Workers was ientified as a major constraint on the delivery of services; and it was this identification tha prompted the formulation of proposals for a Regional Project for the Education and Training of Allied Health Personnel; and its implementation since July, 1975.

No less tha 149 candidates (100 of them from the NCCs were awarded Fellowships beteen 1975 and 1978 for training in a wide range of hospital and community health disciplines - at the University of the West Indies, the University of Guyana, the Barbados Community College, the College of Arts, Science and Technology and the Dental Auxiliary School in Trinidad; and on post-basic programmes in Community Health in the Bahamas and at the West Indies School of Public Health in Jamaica; in Advanced Nursing Education at the Advanced Nursing Educatin Unit (UWI), the Diploma in Community Health, and on the PAHO/WHO Leadership programmes in Health Sciences Education and Health Services Management. Nevertheless, there are still substantial numbers of untrained Allied Health staff and vacant posts in the Health services of the countries.

CONCLUSIONS

This section has set out some of the key data relating to the health facilities, their organisation and the human resources available to man them. The information emphasises the wide variation which exists in the level of sophistication of health facilities in the Region. In general both as regards equipment and personnel, the LDCs are worse off in most areas.

The rising expectations of the Caribbean include expectations of improved and wide-spread health care. Within the limits of the finances available to most countries, the governments will be hard pressed to increase in large measure the toal funds at the disposal of the health sector and also there are needs which are equally difficult to fill, due to the uneven distribution of trained personnel and the small sizes of certain communities.

In such a situation the possible advantages of more extensive use of telecommuniation techniques seems to demand careful examination.

CHAPTER SIX

EDUCATION IN THE CARIBBEAN

The Commonwealth Caribbean possesses an almost unique educational homogeneity. The territories make use of similar systems of teaching, similar curricula, a common examination system involving the same methods of assessment, and prepare students for entry to the same University. This common ground suggests the likelihood of an aggregation of efforts in Education and Training with the aim of providing improved services at affordable costs.

The Educational Objectives of the Caribbean Governments

The Governments of the Region share many educational objectives and programme directions, aimed at improving the quality of education and expanding the school populations. These include the development of curricula and educational materials and upgrading the skills of teachers, management and supervisory staff. Education of the handicapped is also receiving attention. Each territory will, of course, have its own particular needs and the University will not, even in principle, be able to fill many of these.

The Present Status

The educational system in each territory is administered by a Minister who is responsible for overall development and operations. The Governments all provide at least to some extent, pre-school, primary, secondary, special and post-secondary level education, including vocational and teacher training programmes. The types of institutions are summarised in Table 21.

The Scale of Education

Tables 21 and 22 summarise some recent information provided by the Ministers of Education.

Table 21: Aspects of the Caribbean Educational Structure.

Level	Ages	Types of Institutions
Early Childhood	4-5	Infant Schools, Infant Departments Basic Schools.
Primary and All-Age	6-11 6-16	Primary schools; All Age Schools, Special Schools.
Secondary	11-19	Junior Secondary Schools, Comprehensive High School, High Schools, Technical High Schools.
Vocational Educational	15-17+	Vocational Schools, Trade Training Centres.
Tertiary Education	17+	Teacher Training Colleges, Schools of Agriculture, College of Arts, Science & Technology (Jamaica), John Donaldson,(Trinidad) and other colleges.
Higher Education	17+	The University of the West Indies.

Table 22: Some Educational Statistics for the Caribbean for 1981. (Primary includes the numbers in All-Age and Infant Schools. UWI and Special Education Programmes are omitted).

Territory	Types of Institutions	No. of Institutions	Enrolment	Percent Age Group	No. of Full-Time Staff
ANTIGUA	Primary	31	8,265	64	+
	Secondary	9	4,451	34.6	+
	Tertiary	1	329	1.0	30
	Total	41	13,045	+	694
BAHAMAS	Primary	184	37,253	90.8	1,646
	Secondary	37	23,989	69.6	1,329
	Tertiary	2	1,548	4.1	148
	Total	223	62,790	+	3,123
BARBADOS (1)	Primary	136	37,329	100	1,588
	Secondary	44	31,366	+	1,308
	Tertiary	5	3,905	+	270 (2)
	Total	185	72,600	+	3,166
BELIZE	Primary	195	35,360	+	1,312
	Secondary	23	6,256	+	406
	Tertiary	4	357	+	45
	Total	224	41,973	+	1,780
B.V.I.	Primary & Secondary	+	-	-	238
DOMINICA	Primary	58	21,221	+	536
	Secondary	8	3,109	+	137
	Tertiary	3	213	+	22
	Total	69	24,543	+	829
GRENADA	Primary	61	22,241	+	792
	Secondary	18	5,897	+	223
	Tertiary	7	1,109	+	52
	Total	85	29,247	+	1,067

JAMAICA (3)	Primary	815	442,135	94	11,084
	Secondary	138	162,409	58	7,261
	Tertiary	13	9,665 (4)	+	615
	Total	966	614,209	+	20,005
MONTSERRAT					160
ST. KITTS/ NEVIS	Primary	19	6,184	+	323
	Secondary	7	4,353	+	352
	Tertiary	1	64		13
	Total	27	10,601	+	688
ST. LUCIA	Primary	77	31,740	86	942
	Secondary	11	4,675	27	220
	Tertiary	3	541	4	52
	Total	91	36,956		1,214
ST. VINCENT	Primary	97	25,922		
	Secondary	20	5,471		
	Tertiary	1	107		
	Total	118	31,500		

Note: + = Information not available
(1) This includes private institutions.
(2) Includes part-time staff
(3) Institutions which have Teacher training
(4) Of theese 1,710 are part-time.

Table 22 contains very little information from the British Virgin Islands and Montserrat and nothing from the Cayman Islands and Trinidad and Tobago. Nevertheless it lists 2,000 institutions with an enrolment of one million and some 32,000 teachers. But these are low figures because the estimated population of the age group 5 - 20 years using United Nations figures is already in excess of 1.5 million. In Jamaica alone fifty new primary schools and fifty new secondary schools are to be built. The demand for teachers will be very great. Not only does the educational system need to be improved, but it must at the same time be expanded.

There is no easy measure of performance of an educational system. Certainly a considerable number of Caribbean students perform excellently by any standards, and the intake into the University,

although this already selects from those who have been successful in the school system, perform reasonably well. But it is commonly held that much is wrong with the Caribbean educational system. Students, parents, teachers and governments complain, often along the lines of the following quotations extracted from a recent Manpower Study:*

The LDCs in General

- "...the existing institutions for providing trained teachers and agriculturists are incapable of meeting the national needs. This condition is unlikely to be changed radically in any of the states examined in the near future."

Antigua

- "There is a serious shortage of trained (agricultural) extension staff."
- "There is a crippling lack of persons with degrees in Agriculture. Since 1968 for example, there have been no new B. Sc. graduates.... The extension arm is especially weak - most of the extension officers having experience in sugar technology only."
- "...81 percent of those who sat the GCE "O" level examinations received only two or less passes, while of those who sat at the advanced level 66.7 percent received no passes at all and another 4.8 percent received one pass only."

Dominica

- "...there is only one Geography Teacher among six secondary schools; and someone from India was hired to teach English."

St. Kitts/Nevis

- "In many instances subjects are being taught (in secondary schools) by GCE "O" level graduates".

St. Vincent

- "...81.6 percent of those who sat the "O" level examinations (in 1976) gained 0-3 passes only."

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*Manpower Report on Less Developed Countries in the Caribbean: with special reference to Agriculture and Education. I.S.E.R. University of the West Indies, Mona, Jamaica (1977).

"...subjects such as Biology, Chemistry, Physics and French are often not taught for lack of tutors...."

Although no one would disagree that much needs to be done, there is no agreement on what to do.

Examination Results

Examinations play a major, perhaps the major part, in marking the progress of students through the educational system. These include common entrance examinations, achievement tests, the examinations of the Caribbean Examinations Council and a variety of overseas examinations, the main ones of which are the "O" and "A" level General Certificates of Education, and examinations of the London City and Guilds and the Union of Lancashire and Cheshire Institutes which are mainly used by students of technical high schools.

The General Certificate of Education at the ordinary level is particularly important for secondary schools since it provides an accepted measure of the suitability of candidates for further study and also serves as a school-leaving qualification. Tables 23 to 28 give analyses of the numbers of "O" level subjects offered and passed in 1973. The data for other West Indies includes results for the non-campus territories which support the University and also Anguilla, the Turks and Caicos Islands and Bermuda. Our sources did not separate these results.

Table 23: The Numbers of Ordinary Level Subjects Offered and Passed in the Summer 1973 Examinations in Barbados.

No. of Sub.	No. Sitting	Number Passing in "n" subjects (n = O to 9)									
		0	1	2	3	4	5	6	7	8	9
1	183	91	92								
2	185	78	68	39							
3	341	146	103	65	27						
4	418	135	115	104	43	21					
5	355	44	85	87	83	46	10				
6	421	10	47	57	43	36	32	16			
7	172	2	17	23	30	31	28	29	12		
8	136	3	7	21	19	18	22	18	20	8	
9	23					1		4	4	6	8
Total	2054	509	534	396	245	153	92	67	36	14	8

Table 24: The Numbers of Ordinary Level Subjects Offered and Passed in the Summer 1973 Examinations in Jamaica.

No. of Sub.	No. Sitting	Number passing in "n" Subjects (n = 0 to 10)										
		0	1	2	3	4	5	6	7	8	9	10
1	728	374	354									
2	727	224	287	216								
3	641	268	218	110	45							
4	888	285	280	198	97	28						
5	1410	240	384	307	262	155	62					
6	1292	126	236	266	266	189	129	80				
7	980	36	96	144	177	160	154	137	76			
8	721	8	43	56	95	80	106	110	128	95		
9	153	1	3	9	7	17	9	25	22	36	24	
10	18				7		1		3	5	2	7
Total	7558	1562	1901	1306	949	629	461	352	229	136	26	7

Total 25: The Numbers of Ordinary Level Subjects Offered and Passed in the Summer 1973 Examinations in Trinidad and Tobago.

No. of Sub.	No. Sitting	Number Passing in "n" Subjects: (n = 1 to 9)								
		0	1	2	3	4	5	6	7	8	9
1	309	173	136								
2	253	104	95	54							
3	693	321	215	116	41						
4	1088	393	313	195	129	58					
5	2735	889	686	481	358	207	114				
6	2279	495	495	400	334	253	204	98			
7	1767	204	261	249	232	202	271	213	135		
8	1111	28	61	81	94	137	149	153	194	215	
9	61	2	7	11	7	8	3	4	3	7	9
Total	10296	2609	2269	1587	1195	865	741	467	332	222	9

Table 26: The Numbers of Ordinary Level Subjects Offered and Passed in the Summer 1973 Examinations in the Other West Indian Territories.

No. of Sub.	No. Sitting	Number Passing in "n" Subjects (n = 0 to 9)									
		0	1	2	3	4	5	6	7	8	9
1	638	399	239								
2	787	401	266	120							
3	1018	493	308	157	60						
4	948	297	285	192	110	64					
5	913	198	241	204	153	86	31				
6	581	57	127	114	114	90	62	17			
7	257	7	33	47	44	43	38	26	19		
8	98	1	5	8	11	12	20	12	14	15	
9	15			1		1	3	6		2	2
10	5		2	1							2
Total	5260	1853	1506	844	492	296	154	61	33	17	4

Table 27: The Numbers of Ordinary Level Subjects Offered and Passed in the Summer 1973 Examinations - for all Caribbean Centres.

No.of Sub.	No. Sitting	Number Passing in "n" Subjects (n = 0 to 10)										
		0	1	2	3	4	5	6	7	8	9	10
1	1858	1037	821									
2	1952	807	716	429								
3	2693	1228	844	448	173							
4	3342	1110	993	689	379	171						
5	5413	1371	1396	1079	856	494	217					
6	4393	688	905	837	757	568	427	211				
7	3176	249	407	463	483	436	491	405	242			
8	2066	40	116	166	219	247	297	292	356	333		
9	252	3	10	21	14	27	15	39	29	51	43	
10	23		2	1			1		3	5	4	7
Total	25168	6533	6210	4133	2881	1943	1448	947	630	389	47	7

Like all statistics these must be treated with caution, but the figures are not at all good. Table 28 gives the percentages of students who passed in no subjects at all and in one subject only and therefore are the very lowest performers.

Table 28: Percentage Passes in no Subjects and in only one Subject in the 1973 "O" Level Examinations

Territory	Percentage Passes in: No Subject	One Subject
Barbados	25	26
Jamaica	21	25
Trinidad & Tobago	35	29
Aggregate	26	25

It must be a cause for real concern that of some 25,168 students sitting these examinations, 6,533 go no passes at all and only 6,210 got but one subject (of these 1,858 sat only one). But even worse is the fact that the situation is deteriorating. Table 29 gives the rates for candidates who did not pass a single subject. The results reflect an enormous wastage of resources both human and financial.

Table 29: Percentages of Candidates who Failed Every Subject in Cambridge "O" Level Examinations for all Caribbean Centres.

	1975	1977	1979	1981
No. of Candidates	27,143	34,649	40,196	44,462
Percentage failing all subjects	27.3	30.8	44.7	48.1

Some idea of the overall quality of the performance is given by the aggregate data for 1979 in Table 30 which gives the number of subjects offered and the numbers in which a grade C or better was achieved.

Table 30: The Numbers of Ordinary Level Subjects Offered and Passed at Grade C or Better in Summer 1979 for all Caribbean Centres.

No. of Sub.	No. Sitting	Number of those reaching Grade C or above in "n" Subjects (n = 1 to 10)										
		0	1	2	3	4	5	6	7	8	9	10
1	3238	2216	1022									
2	3848	2424	1230	394								
3	5921	3368	1242	768	303							
4	6648	3358	1569	972	540	209						
5	8049	3668	1673	1173	837	504	194					
6	6122	2231	1176	917	751	555	346	146				
7	3923	603	546	527	532	531	477	409	298			
8	2113	83	118	178	203	240	294	311	337	349		
9	309	12	8	24	21	26	38	38	53	44	45	
10	35		2	1		1	5		1	4	7	4
Total	40196	17963	8626	4954	3187	2066	1354	904	689	397	52	4

Since the University matriculation requirements in effect mean that most candidates for acceptance must at some stage have acquired at least 5 "O" levels, the number of successes in five or more subjects at the Grade C or better is a measure of a reasonably good performance. For other purposes, e.g. admission to other tertiary institutions or qualifications to enter many jobs, three "O" levels are acceptable. Tables 31 and 32 present these data by major groupings and totals for the Caribbean for 1973 and 1979 respectively.

Table 31: Pass Rates for all Caribbean Centres for Students Sitting Three or More and Five or More Subjects at "O" Level Examinations in Summer, 1973.

Three "O" Levels

Territory	No. Sitting 3 or More	No. Passing 3 or More	Percent Pass Rate
Barbados	1,686	615	36.5
Jamaica	6,103	2,789	45.7
T'dad & Tobago	9,734	3,831	39.4
Other West Indies	3,835	1,057	27.6
All	21,358	8,292	38.8

Five "O" Levels

Territory	No. Sitting 5 or More	No Passing 5 or More	Percent Pass Rate
Barbados	927	217	23.4
Jamaica	4,574	1,211	26.5
T'dad & Tobago	7,953	1,771	22.3
Other West Indies	1,869	269	14.1
All	15,323	3,468	22.6

Table 32: Pass Rates for Caribbean Centres for Students Sitting 3 or More and 5 or More Subjects at "O" Level Examination Summer 1979.

Three "O" Levels

Territory	no. Sitting 3 or More	No. Passing 3 or More	Percent Pass Rate
Barbados	2,167	807	37.2
Jamaica	8,264	2,930	35.5
T'dad & Tobago	18,695	3,761	20.1
Other West Inndies	3,984	1,155	29.0
All	33,110	8,653	26.1

Five "O" Levels

Territory	No. Sitting 5 or More	No. Passing 5 or More	Percent Pass Rate
Barbados	998	271	27.2
Jamaica	5,263	1,164	22.1
T'dad & Tobago	12,625	1,651	13.1
Other West Indies	1,655	314	19.0
All	20,541	3,400	16.6

There has been a very significant increase (55 percent) between 1973 and 1979 in the numbers sitting three or more "O" levels; most of this is due to Trinidad and Tobago which alone accounts for a 42 percent increase. But the absolute numbers of students passing three or more "O" levels has hardly increased. The increases in both those sitting and passing from the LDCs are only marginal.

The situation with five "O" levels is rather similar. Trinidad accounts for most of the increased numbers; Barbados has an improved pass rate; Jamaica's pass rate has deteriorated and Trinidad's even more so; the NCCs show a significant improvement. With all the former caveats on the interpretation of the statistics, these examination results indicate that the entire Caribbean secondary system, not just that of the NCCs, is desperately in need of improvement in quality. The system is also inadequately sized to deal with the entire age cohort.

"A" Levels

"A" level results are also a significant marker since these to a large extent determine entry to the three year University programmes,

although various schemes do exist for alternate entry paths, e.g. N1 and Preliminary Agriculture. The "A" levels are sat at the end of the student's school career and a prerequisite is usually a satisfactory pass in the corresponding "O" level subject. Hence the selection is rather tight and these candidates represent the top of the academic stream. Table 33 summarises the "A" level results for 1973.

Table 33. General Certificate of Education "A" Level Results for Summer 1973: Number Passing in "n" Subjects

Barbados

No. of Subjects	No. of Candidates	"n" 0	1	2	3
1	86	60	26		
2	158	65	56	37	
3	64	8	12	25	19
4	1		1		
Total	309	133	95	62	19

Jamaica

No. of Subjects	No. of Candidates	"n" 0	1	2	3	4
1	226	117	109			
2	301	130	109	62		
3	591	157	165	155	114	
4	50	6	10	7	9	18
5	1					1
Total	1,169	410	393	224	123	19

Trinidad & Tobago

No. of Subjects	No. of Candidates	"n" 0	1	2	3
1	8	7	1		
2	333	123	112	98	
3	882	155	210	220	297
4	3	1	2		
Total	1,226	286	325	318	297

Other West Indies

No. of Subjects	No. of Candidates	"n" 0	1	2	3
1	97	67	30		
2	177	110	47	20	
3	114	40	28	24	22
4	1			1	
Total	389	217	105	45	22

Table 34 summarises the previous results.

Table 34: General Certificate of Education "A" Level Results for Summer 1973 for all Caribbean Centres: Number Passing in "n" Subjects (n = 0 to 4).

No. of Subjects	No. Of Candidates	"n" 0	1	2	3	4
1	417	251	166			
2	969	428	324	217		
3	1,651	360	415	424	452	
4	55	7	13	8	9	18
5	1					1
Total	3,093	1,046	918	649	461	19

Table 35 summarises the "A" level results for 1979.

Table 35: Analysis of General Certificate of Education "A" Level Results for Summer 1979: Number Passing in "n" Subject (n = 0 to 3).

Barbados

No. of Subjects	No. of Candidates	"n" 0	1	2	3
1	192	143	49		
2	221	70	99	52	
3	145	12	25	35	73
Total	558	225	173	87	73

Jamaica

No. of Subjects	No. of Candidates	"n" 0	1	2	3	4
1	310	217	93			
2	484	299	137	48		
3	637	198	198	144	97	
4	49	4	14	11	5	15
Total	1,480	718	442	203	102	15

Trinidad & Tobago

No. of Subjects	No. of Candidates	"n" 0	1	2	3
1	21	10	11		
2	456	225	136	95	
3	1,051	259	249	247	296
Total	1,528	494	396	342	296

Other West Indies

No. of Subjects	No. of Candidates	"n" 0	1	2	3	4
1	169	136	33			
2	242	136	75	31		
3	151	44	33	36	38	
4	2			1		1
Total	564	316	141	68	38	1

The "all Caribbean" totals for 1979 in Table 36.

Table 36: Summary of General Certificate of Education "A" Level Results for Summer 1979 for all Caribbean Centres. Number Passing in "n" Subjects (n = 0 to 4).

No. of Subjects	No. of Candidates	"n" 0	1	2	3	4
1	692	506	186			
2	1,403	730	447	226		
3	1,984	513	505	462	504	
4	51	4	14	12	5	16
Total	4,130	1,753	1,152	700	509	16

One major indicator of the effectiveness of the educational system must be the percentages of students who, despite all the previous selection processes, still receive no passes at "A" levels. Tables 37 and 38 give these results for 1973 and 1979.

Table 37: Percentages of Candidates who attained no Passes in "A" Level Examinations in Summer, 1973.

Territory	Percentage of Candidates Achieving no Passes: Aggregate	Percentage of Candidates Achieving no Passes: Candidates who sat one Subject only.
Barbados	43.0	69.8
Jamaica	35.1	51.8
Trinidad & Tobago	23.3	87.5
Other West Indies	55.8	69.1
All	33.8	60.2

Table 38: Percentages of Candidates who attained no Passes in "A" Level Examinations in Summer, 1979.

Territory	Percentage of Candidates Achieving no Passes: Aggregate	Percentage of Candidates Achieving no Passes: Candidates who sat one Subject only
Barbados	43.0	74.5
Jamaica	48.5	70.0
Trinidad & Tobago	32.3	47.6
Other West Indies	56.0	80.5
All	42.4	73.1

In 1973, 33.8 percent of the candidates throughout the Caribbean received no passes at "A" level (the corresponding figure for "O" level is 26 percent). In 1979 the corresponding figure was 42.2 percent, the same as in 1981. The failure rate of those candidates who sit one subject only is very high indeed, as high as 78.4 percent for 1981.

Barbados and the NCCs showed increases in the numbers sitting "A" levels of 80.6 and 45.0 percent respectively, while the increases for Jamaica and Trinidad and Tobago are rather smaller, 26.6 and 24.6 percent respectively. The overall increase for the Region is 33.5 percent. The increased numbers are a good sign, but as the summaries in Tables 39 and 40 show, the quality of the performance has, if anything deteriorated.

Table 39: Summary of Results for General Certificate of Education "A" Level Examinations Summer, 1973 for all Caribbean Centres.

No. of Papers	No. of Candidates	Number of Candidates Obtaining: No. Passes (Percent)	Two or more Passes (Percent)
1	417	251 (60.2)	
2 or more	2,6 76	795 (29.7)	1,129 (42.2)
All	3,093	1,046 (33.8)	

Table 40: Summary of Results for General Certificate of Education "A" Level Examinations, Summer 1979 for all Caribbean Centres.

No. of Papers	No. of Candidates	Number of Candidates Obtaining: No Passes (Percent)	Two or more Passes (Percent)
1	692	506 (73.1)	
2 or more	3,438	1,247 (36.3)	1,225 (35.6)
All	4,130	1,753 (42.4)	

The examination results reinforce the harsh comments reported earlier. Many reasons for the present state of affairs have been advanced. These include: inadequate financing of the schools, inadequate staffing, and the social effects of the rapid expansion of educational opportunities. But while there is agreement on the nature of the problem, the cures are still evasive and certainly massive inputs of funds seem unlikely in most territories. In these circumstances some rather novel approaches are going to be necessary for there to be much impact on the secondary educational system.

SPECIAL EDUCATION

The education of the handicapped has been receiving increased attention in the Caribbean Region, due largely to the remarkable level of co-operation which has developed between the governments, private voluntary organisations and various educational institutions. But the overall effort is still inadequate and the present provision and methods require reassessment to meet the increasing demands.

Progress in Special Education in the Caribbean

Programmes for the handicapped in the Caribbean were pioneered by various voluntary organisations who, with increasing help from the Governments, remain responsible for much of the special services. Progress has been slow and uneven although there is much promise for improvement. Probably the most significant advances have been made in the areas of mental retardation and deafness, where school places have been more than doubled in the last eight years.

Problems in Development of Service

One obvious general constraint is the lack of funds but the following areas are also important:

1. Lack of trained manpower;
2. Lack of training capability;
3. Lack of appropriate models for effective cost-beneficial delivery.

The Present Status of Special Education Schools

The majority of the Caribbean territories have educational provisions for handicapped children between the ages of six and fifteen years and a few have also established:

- prevention programmes
- pre-school facilities;
- school-leaving services;
- social welfare programmes; and
- provision for the multiple-handicapped.

Table 41 gives the enrolments and numbers of staff in the various activities.

Table 41: Schools for the Handicapped. Information provided by Ministries of Education.

Territory	No. of Schools	Enrolment	Staff Qualified	Staff Unqualified	Staff Total
Antigua	2	54	4	5	9
Bahamas	4	170	21	5	26
Barbados	1	93	13	1	14
Belize	1	53	5	3	8
Dominica	3	33	4	6	10
Grenada	2	53	4	6	10
Jamaica	6	1,742	89**	73**	162
Montserrat			23		
St. Kitts/Nevis	2	21	3	-	3
St. Lucia	3	106	17	7	24
St. Vincent	2				
Trinidad & Tobago		786			

**Estimated on a 45/55 basis

There are schools for handicapped children in all 14 territories. Most of the provison has been for the mentally retarded and the deaf. The age range of pupils varies but in most territories it is between 6 and 17 years.

Jamaica has provision for just over 2,000 children with a wide range of options, including mainstreaming and residential care for the severely handicapped. Trinidad follows closely in pupil numbers and range of services but in fact these territories are now only providing adequately for a small proportion of the target population. However, the programmes are being expanded by developing present facilities, by establishing programmes at both the pre-school and school leaving levels, and by initiating services for the multiple-handicapped.

Vocational Guidance

The larger territories have established vocational guidance programmes for the handicapped. The institutions serving the blind have had the longest history in establishing skill training in sheltered institutions. The schools for the mentally retarded and the deaf are now being involved in establishing school leaving services including vocational training and job placement.

Early Detection

A start has been made in the Bahamas, Barbados, Jamaica and Trinidad and Tobago to establish early detection programmes. These are assessment programmes in hospitals, clinics and schools operated by both government and non-government agencies. The best established facilities are in Jamaica. The new Diagnostic Centre at Mico College in Kingston is the outstanding example of these.

Pre-School

Presently, pre-school services are found in Belize, Jamaica, St. Lucia, and Trinidad and Tobago.

Teacher Training for Special Education

There are some 4,000 children in special schools throughout the Caribbean but it is estimated that there are now some 180,000 children in need of special education.

If the figures for Guyana are included, there are currently 543 full-time teachers providing special education instructions. Table 42 shows the categories and levels of training of these teachers.

Table 42: Categories and Levels of Training of Teachers.

Teachers of the:	Specialist	Teacher Trained	Pre-Trained	Total
Blind	12	22	18	52
Deaf	62	83	50	195
Mentally Retarded	15	68	48	131
Physically Handicapped	36	59	70	165
Total	125	232	186	543

The present teacher/pupil ratios are as follows:

a.	Specialist Teacher/Pupil	1 : 32
b.	Trained Teacher/Pupil	1 : 12
c.	Any categories of Teacher/Pupil	1 : 8

If the quality of the service is to be improved, even without expansion, the pre-trained teachers should obtain adequate professional training. Currently there are nearly 200 pre-trained teachers working in Special Education programmes. The largest numbers are in programmes for the deaf and physically handicapped both in Jamaica and Trinidad and Tobago. At present the major programme in special education is a three year teacher training course at Mico College in Jamaica. This course accepts pre-trained teachers and high school students who meet the entrance requirements. It can accept up to 60 students per year and offers limited admission to students from other territories. Most of the teachers' colleges in the territories recognise the need for trained special education teachers, but do not feel equipped to provide such programmes at this time.

Other Training Programmes

There are in-service programmes which are supported by the

various non-governmental organisations. These are:

1. A Diploma in Education of the Deaf (The British Association of the Teachers of the Deaf College) is offered by the Association for the Deaf in Jamaica, and the Stella Maris School, Belize City. This is an in-service programme which spans an eighteen month training period.

2. Short-term, on the job training courses in a variety of specializations have been provided in most territories by the Caribbean Association on Mental Retardation, the Jamaica Council for the Handicapped and the Caribbean Institute on Mental Retardation, since 1971.

3. Finally, there is a one year course offered at Mona which leads to a Certificate in Education for Teachers of the Deaf. There are ten places, of which four are sponsored by the Government of Jamaica. The governments of most NCCs can only infrequently send students to this course due to a lack of funds.

Training for Support Staff including Administrators

There is presently no suitable training within the Region for programme administrators. Sending personnel overseas for training is a costly business both in terms of money and also in terms of loss of expertise from the Region as many of those who go overseas never return. There are a number of programmes for other support staff as follows:

(1) one year Certificate Course for Occupational Therapists' assistants in Barbados;

(2) two-year Certificate Course for Physiotherapists at the University Hospital of the West Indies, Mona, Jamaica;

(3) local in-service training programmes for unqualified teachers working in special education;

(4) short-term supervisory and direct service personnel training for pre-school day care programmes at the Regional Pre-School Child Development Centre at the Mona Campus of the University of the West Indies.

Numbers of Teachers Needed

The magnitude of the needs is indicated in Table 43 by example statistics for Antigua, Belize, Grenada, Jamaica, and St. Lucia.

Table 43: Relationship between Estimated Numbers of Handicapped Children Existing School Places, Teachers Available, and Teachers Needed.

	Antigua	Belize	Grenada	Jamaica	St. Lucia
Handicapped Children out of school	900	1,400	1,200	79,000	1,400
Children in Special Schools	56	99	84	2,148	102
Teachers Available	9	13	13	223	17
Teachers Needed (Ratio of 1:13)	69	108	92	6,065	108

It is difficult to assess the exact needs for special education teachers without better data for all the territories although obviously, if all children requiring special education were to be schooled there would be an enormous need for additional teachers. In Jamaica it has been projected that 6,000 teachers are needed; nearly 26 times the number currently employed. Even if one merely estimates on the basis of the population of the Region, the number begins to look like over 10,000.

It is unrealistic to expect to train or employ such large numbers of new special education teachers even over a period of many years, but this only emphasises the extent to which non-traditional programmes are needed to make all the teachers much more effective.

There is also the need to give large numbers of teachers some basic knowledge of problems related to handicapped children as many children in the regular school system also suffer from various handicaps. Teachers should learn to recognise the signs of the handicaps which are most likely to affect children as it is largely on the classroom teachers, often working in isolation from professional advice, that a fundamental part of programmes for handicapped children must depend.

Number of trained Support Staff including Administrators Needed

Exact data regarding support staff including administrators are not available. From the results of the surveys in Jamaica, visits to the territories, and discussions, there is a clear indication of severe shortages. For example, on average only 35 therapists are trained in the Region each year, whereas there are over 80,000 handicapped children in Jamaica alone.

Extension Work in Special Education

Very few of the Caribbean territories can afford either to train or to employ enough qualified special educators/administrators, yet

useful work with handicapped children depends largely on the expertise of the teaching and service personnel. There are two parallel avenues of approach to this situation. One is to upgrade the teachers presently in Special Education programmes and the other is to devise personnel preparation programmes which allow the greatest degree of integration of handicapped children into existing educational programmes and support services.

In any programme, however, it should be useful to recognise that in most instances, the primary responsibility for the handicapped child rests with parents and a measure of parent education, however slight, would be of much value.

The cheapest effective telecommunications programme would probably be at the level of the UWI Certificate in Education and should involve the collaboration of UWI. Mico and other teachers' colleges. The programme should be in-service and might train teachers, support service personnel, administrators and parents. Professionals from the various agencies should be fully involved.

RECOGNITION OF THE PROBLEMS IN EDUCATION

All the Caribbean territories recognize the serious problems in most aspects of their educational systems, are anxious to solve these, and are taking various steps towards improvements. For example a few of the topics receiving urgent consideration in Jamaica are:

1) the establishment of fifty new primary and fifty new secondary schools;

2) new thrusts in the education of the handicapped;

3) investigations on the potencial value of increased use of technology throughout the educational system.

The non-campus territories have been no less concerned as shown by the example below:

The Dominica Conference

In February, 1981, a conference of Ministers of Education of the Eastern Caribbean NCCs held in Dominica once again focussed attention on the educational systems of these territories. In essence the Ministers recognized the deficiencies of the educational systems, sought ways to overcome these and appealed to the University of the West Indies to do all in its power to assist.

The problem was partially defined in terms of the following characteristics of the school systems:

a) large numbers of graduate and non-graduate teachers who have not undergone any professional training;

b) untrained graduate teachers playing major roles and carrying out critical functions;

c) inappropriate teaching methods;

d) the lack of innovation in programmes related to the needs of the communities in which the schools are found.

The first major step toward the solution of these problems was considered to be a year round in-service teacher education programme. It is envisaged that two centres would be required for summer vacation courses, one in the Leewards the other in the Windwards and that about 18 University level teacher trainers (with counterparts in the countries) would be needed. This programme has now been costed by UWI and funds are being sought for an early beginning.

CONCLUSIONS

Despite the high quality of a small proportion of the output, the educational systems in the Caribbean are completely inadequate. There are not sufficient funds available in most instances to maintain the quality of the existing plant, to provide educational equipment or even in many territories to pay teachers at levels of salaries which appear reasonable. It is not even fully understood exactly what steps beyond greater expenditures would provide considerable improvements, but there is at least agreement that more and better teacher training both in UWI and the teachers' colleges is one essential item.

In this situation novel approaches are vital; the possible application of distance education methods therefore seems particularly attractive but this must first be examined on a scale which is large enough to be definitive, but not so large as to divert too much of human and financial resources from an already fragile system.

CHAPTER SEVEN

EXPENDITURES AND DEMOGRAPHIC TRENDS

Expenditures on Agriculture, Health and Education

It is generally agreed that in national development Agriculture, Health and Education must play key roles. Indicative Government expenditures on these items have been estimated for most of the Caribbean countries which support the University of the West Indies. These are only indicative because:

1. Ministerial responsibilities are grouped differently by each territory, and in order to make the figures comparable, certain items were removed and others reallocated between Ministry budgets. As a result, some of the figures presented here are not the total which a particular country reported.

2. In certain instances suitable data for our purposes were not available. Data were taken from the following budgets:

   For 1980, Bahamas, Barbados, Cayman Islands, Dominica, Jamaica, Montserrat, St. Lucia, and St. Vincent. Data for St.Kitts/Nevis/Anguilla were from the 1974 budget and for Trinidad and Tobago, 1981.

3. Local currencies were converted into approximate U.S. dollar equivalents at the 1st January for the calendar year in which the budget year ended.

4. Particularly for education and training, the figures shown are minimum estimates, since Ministries other than education are perforce involved in various training schemes.

The combined estimates are shown in Table 44. These are not exact and to emphasise this, the figures are given in the nearest million dollars.

Table 44: Combined Estimates of Expenditure in Territories which support the University of the West Indies (millions of US Dollars).

	Education	Agriculture	Health	Total Budget
Recurrent Expenditure	451	82	256	2,452
Capital Expenditure	45	77	20	2,068
Total	496	159	276	4,520

These are relatively crude estimates (actual figures for the expenditures other than the total budget are probably much higher), but it is clear that throughout the Caribbean region we are dealing with an annual expenditure in the three areas being considered of the order of US$1 billion. The total of the budgets of the territories of the order of US$4.5 billion, but it should be noted that Trinidad and Tobago's contributions to these figures is high, roughly 50 percent.

These budgets are considered to be too small and each sector cries for increases; but the sums involved are substantial by Caribbean standards. It is of course, hoped that budgets will grow substantially as the region develops but a considerable portion of the increase will be needed to cope with increasing populations. The sums likely to be available are unlikely to be sufficient to fulfil expectations if traditional methods only of delivering public service are available.

Population Trends and Selected Demographic Indicators

Demographic indicators are among the most important in predicting trends and needs. United Nations population projections for low, medium and high variants are available. Since such projections are approximate and the differences between the various categories are not remarkable (for example the population of Trinidad and Tobago in 2000 is given as 1,258,000 as a low or 1,295,000 as a high), the medium projection is used as the basis for the presentations given in Table 45.

Table 45: Demographic Data and Projections to the Year 2000. Population data in thousands.

BARBADOS

Year	1980	1985	1990	1995	2000
Population	252	252	259	278	285
Under 20 Years	107	101	100	99	95
0 - 4 Years	26	26	25	24	22
5 - 20 Years	81	75	75	75	73
Median Age (Yrs.)	23.6	25.3	27.1	29.0	30.6
Urban Proportion (Percent)	47.2	49.4	52.4	55.1	58.6

Ratio of Population 2000/1980 = 1.10

JAMAICA

Year	1980	1985	1990	1995	2000
Population	2,172	2,316	2,464	2,609	2,726
Under 20 Years	1,218	1,218	1,215	1,224	1,208
0 - 4 Years	311	315	323	321	294
5 - 20 Years	907	903	892	903	914
Median Age (Yrs.)	17.7	19.0	20.3	21.6	23.1
Urban Proportion (Percent)	49.6	53.9	57.9	61.6	64.9

Ratio of Population 2000/1980 = 1.26

TRINIDAD AND TOBAGO

Year	1980	1985	1990	1995	2000
Population	1,062	1,116	1,172	1,230	1,280
Under 20 Years	497	465	447	440	431
0 - 4 Years	117	116	111	109	105
5 - 20 Years	380	349	336	331	326
Median Age (Yrs.)	21.6	23.7	26.1	28.2	30.3
Urban Proportion (Percent)	26.4	28.0	30.1	32.1	35.6

Ratio of population 2000/1980 = 1.21

WINDWARD ISLANDS : DOMINICA, GRENADA
ST. LUCIA AND ST. VINCENT

Year	1980	1985	1990	1995	2000
Population	391	409	422	432	437
Under 20 Years	232	231	224	214	199
0 - 4 Years	61	59	55	51	46
5 - 20 Years	171	172	169	163	153
Median Age (Yrs.)	16.5	17.5	18.8	20.2	22.2
Urban Proportion (Percent)	21.5	23.0	24.9	27.1	29.8

Ratio of Population 2000/1980 = 1.12

Source: United Nations Statistics

Data for the Leeward Islands as a group were not available, but addition of these would not change the overall predictions significantly.

The populations are projected to continue to increase over the next twenty years but there will be a steady decrease in the rates of natural increase as the birth rates decrease. Due to this, the median

ages, which have already probably passed through a minimum a decade or so ago, are increasing slowly. For most territories the median age is projected to be over 22 (over 30 for Barbados and Trinidad and Tobago) by 2000. The population densities will increase of course, and the rural to urban drift will continue. By 2000 Jamaica will have 65 percent of its population in the urban environment and Barbados 51 percent. The other territories for which data are available will have a 30 to 35 percent urban population. The population growths will be largest for Jamaica and Trinidad and Tobago, increasing by over 20 percent between 1980 and 2000. The Barbados increase like that of the Windwards, will be around 10 percent.

Although the populations will grow, the absolute numbers in the school ages in almost every territory should have peaked or will peak around 1985. This is good news for planners since it means that any scale of education considered adequate now, will remain so for the readily forseeable future. However, it is agreed that the scale of eduation is now far from adequate, and that the capabilities for continuing education in a wide variety of fields are but rudimentary. Moreover, as the Region develops there will be an increasing need for continuing adult education. Nevertheless, the trends are hopeful.

CHAPTER EIGHT

SEMINARS, MEETINGS AND DEMONSTRATIONS

The original project plan had envisaged island visits by three persons to assess the local demand and feasibility for prospective services and to gather suggestions for other possible services.

It was early realised, however, that this was unnecessary, and would have been ill-advised, since:

1. The University had already carried out a very thorough study a decade ago and had had continuous updates;

2. Many other studies of various aspects of work in the NCCs had been completed with little concrete benefits accruing to those territories. There seemed little point in adding to those;

3. In view of the above, a programme involving perhaps 50 man days hardly seemed cost effective. Nevertheless, certain visits had to be made. Barbados, Dominica, St. Lucia, Trinidad and Tobago and Guyana received special visits.

The necessary information was obtained during the study by other means including the use of consultants for indepth studies against a growing background of what might be possible. This information was discussed in various forums but particularly in the sessions outlined here. From hindsight, this policy certainly has borne fruit but it seems regrettable that it was not possible to put more effort into demonstrations.

MEETING OF MINISTRIES OF EDUCATION ON THE DRAFT REPORT OF THE CARIBBEAN REGIONAL COMMUNICATIONS SERVICE STUDY HELD ON TUESDAY AND WEDNESDAY, FEBRUARY 24 AND 25 AT MONA

This meeting was held to provide the representatives of the Ministries of Education with an opportunity to discuss the first draft interim report of the CARCOST study. The meeting was attended by the following:

University of the West Indies

Mr. A.Z. Preston, Vice-Chancellor - Chairman
Mr. L.E.S. Braithwaite, Pro-Vice-Chancellor, Principal, St. Augustine
Professor G.C. Lalor, Pro-Vice-Chancellor
Sir Sidney Martin, Pro-Vice-Chancellor, Principal, Cave Hill
Professor L.R.B. Robinson, Pro-Vice-Chancellor, Director, Development and Planning Unit
Professor R.M. Nettleford, Director, Extra-Mural Studies

Dr. M. Aub, Dean, Faculty of Natural Sciences
Professor G.E. Mills, Dean, Faculty of Social Sciences
Professor A.S. Phillips, Dean, School of Education
Dr. S. Wray, Dean, Faculty of Medicine
Mr. W. Blackman, Secretary, Cave Hill
Dr. T. Henderson, Head, Department of Agricultural Extension, St. Augustine
Mr. R. Murray, Member, CARCOST Team
Dr. Marlene Cuthbert, Member, CARCOST Team

Ministries

Mr. C. Edwards - Antigua
Mr. G. Archer - Bahamas
Mr. J. Bynoe - Bahamas
Mr. M. Owen - Barbados
Miss I. Turnbull - British Virgin Islands
Hon. C.A. Maynard, Minister of Education and Health - Dominica
Mr. A. Nesty - Dominica
Mr. O. Benjamin - Grenada
Hon. Dr. Mavis Gilmore, Minister of Education - Jamaica
Mr. R. Moss-Solomon - Jamaica
Mrs. E. White-Samuel - Montserrat
Mr. L. Simon - St. Lucia
Mr. C. Farier - St. Kitts

Caribbean Examinations Council

Mr. W. Beckles, Registrar

The Vice-Chancellor welcomed the participants and outlined the University's role in development. He expressed the hope that the new technologies, some of which the conference would discuss, would be harnessed in the service of the Caribbean.

Pro-Vice-Chancellor Robinson outlined the growth of the University over the years and some of the efforts which have been made to assist the supporting territories, particularly the NCCs. He pointed out that the efforts of the University have been greatly hampered by lack of funds. He expressed the hope that there would be clear ideas on how to develop the educational system and to proceed in a more structured way in providing services which allow for greater development.

Professor Nettleford brought the meeting up to date on the role of the Department of Extra-Mural Studies and indicated some of the efforts made in Extension Studies over the years. Many of the original responsibilities of Extra-Mural have been passed on to other institutions, particularly in the larger territories, but in the smaller territories, the Department still has the responsibility for a wide range of programmes, including preparing people for University entrance. He suggested that the matter of the Open Campus be looked at once again and that the Department of Extra-Mural Studies should be informed on just what the people in the various territories require at

this time.

Professor Lalor outlined many of the areas in which telecommunications are now being used, in the South Pacific, in India, in Canada, in Alaska and a number of other countries. He pointed out the likely advantages in the use of those techniques in an area like the Caribbean which shares a common language, interests and goals and a similar educational system. He emphasised the importance which telecommunications could have in aggregating the needs of various territories to provide economic units. He outlined the facilities available in the Region and within the University for running and maintaining the telecommunications equipment, but informed the conference that whatever programmes are decided on, and on whatever scale they might be, additional staff would be required.

The conference discussed the areas in which the use of telecommunications would be beneficial to the Region and the strategies which might be adopted, and agreed as follows:

That the University of the West Indies should proceed with a pilot project to establish the use of telecommmunications in the service of Caribbean Education.

Noted, however, that:

(i) more detailed studies and consultations would be necessary to identify, inter alia, specific areas and costs including recurrent costs;

(ii) there was a need to monitor and evaluate the project in order to achieve cost effectiveness;

(iii) there was much to be gained by encouraging the University to begin discussions immediately even before the final report was completed, with a view to putting in place a small system initially at the earliest possible time;

(iv) at the important stages, there would be adequate consultation with the territories.

The Conference endorsed the following areas for consideration for a pilot project:

(1) Special Education
(2) In-Service Training
(3) Challenge Examinations and Agricultural Extension.

Demonstrations

Demonstrations were provided for conference participants and others as follows:

- Interactive Information Retrieval

A Texas Silent 700 portable data terminal was used to access the Dialog service in California, via the telephone modems in Miami of Tymnet and Telenet. The demonstration was conducted by UWI staff.

- Use of Satellite Communications

  This was demonstrated by use of video cassettes provided by the Academy for Educational Development and recordings made by UWI.

- Facsimile

  Facsimile reproduction of documents over telephone lines was demonstrated.

- Slow Scan Television

  This was demonstrated by Mr. Wallace Munsey of Robot Research Incorporated who loaned the necessary slow scan equipment. The major portion of the demonstration consisted of a telephone link with the University of Wisconsin, Madison. This was limited to conference participants but Mr. Munsey demonstrated the technique to wider audiences for the two day period.

MEETING OF THE COMMITTEE OF OFFICIALS OF THE CONFERENCE OF MINISTERS RESPONSIBLE FOR HEALTH, NASSAU, BAHAMAS 26 - 28 APRIL, 1981

The Secretariat of the Caribbean Community had requested a paper on the CARCOST study for consideration at the above meeting. The relevant extracts from the report of this meeting follows:

CARIBBEAN REGIONAL COMMUNICATIONS STUDY: HEALTH IMPLICATIONS

Dr. S. Wray reported on a Paper that had been sent to Member States entitled "Regional Communications Study".

He informed the Committee that this "distance teaching" project depended on techniques which could harness existing satellites to establish communiation over wide, including remote, areas of the Region. This would, in principle, result in the "effective presence" of University staff resources in remote areas without the need for the physical presence of such staff. This project would not necessarily have serious cost implications for participating countries.

The project was already in an advanced state of development in Educational and Agricultural Sectors and it was hoped that the Health Sector would avail itself of the opportunities afforded by the project.

It was reported that Ministers responsible for Education had recently endorsed this project and had agreed that Phase II should be embarked upon.

The Conference Agreed -

(i) to support, in principle, the introduction of the use of this type of communications technology;

(ii) to urge that advantage be taken of this project in the furtherance of health promotional activities;

(iii) to request UWI to prepare a paper defining the possible health implications of this type of technology in the Caribbean for the Ministerial Meeting this year (1981).

CONFERENCE OF MINISTERS RESPONSIBLE FOR HEALTH - BELIZE
14 - 16 JULY, 1981

Following on the April 1981 meeting of Officals, the University presented a paper to the meeting of the Conference of Ministers entitled "Telecommunications in Medicine". The University was represented at this meeting by Dr. S. Wray, Dean of the Faculty of Medicine and Professor K.L. Standard.

The Conference passed the following resolution:

RESOLUTION NO. 14

REGIONAL COMMUNICATION PROJECT

THE CONFERENCE

Recognising that distance teaching using the above satellite technology will specifically assist non-campus territories;

Recognising the important implications that this method of teaching holds for the training of such health personnel as Public Health Inspectors, Nurses, health professionals in general and for the continuing education of other health workers:

1. AGREES to -

   (a) a feasibility study in the use of telecommunications for training these categories of workers;

   (b) support the UWI proposal for the establishment of the telemedicine project in order to effect distance teaching; and

   (c) support UWI and its Faculty of Medicine in their effort to raise the required funding from international agencies for the above-mentioned project:

2. COMMENDS the University of the West Indies for its activities in seeking to introduce a pilot satellite technology project for distance teaching.

WORKSHOP ON COMMUNICATIONS IN
AGRICULTURE IN THE CARIBBEAN REGION
ST. AUGUSTINE, 4-5 FEBRUARY 1982.

Ministers and officials with responsibilities for Education and Health matters had the opportunity during 1981 to review and comment on possible applications of a UWI telecommunications system in

providing service to the Region. It therefore seemed useful that Ministries of Agriculture should have a similar opportunity. Accordingly, a workshop was held on February 4 and 5, 1981, in the Conference Room at the St. Augustine Campus.

One unique feature of this workshop was the attendance and participation of the University's Chancellor, Sir Allen Lewis. The participants included the Minister of Education and Health from Dominica, the Honourable Charles Maynard and the following UWI Pro-Vice-Chancellors and Deans:

Professor G.C. Lalor	Pro-Vice-Chancellor
Professor M. Richards	Pro-Vice-Chancellor
Professor L. Wilson	Dean - Faculty of Agriculture
Professor A. Phillips	Dean - Faculty of Education

The Head of the Department of Agricultural Extension, other members of the Faculty and the University, representatives of most of the Governments of the English-speaking Caribbean territories and a representative from USAID, Washington, also participated.

The Workshop was arranged in three sections as follows:

1. A description of the work on telecommunications studies in UWI and the possible applications;

2. Teaching and Research Programmes in the UWI Faculty of Agriculture;

3. A discussion on the possible value and form of a Telecommunications Programme in Agriculture.

There was full and frank discussion on the possible benefits, costs and implications of a telecommunications system for agricultural development. Throughout the discussions it was emphasised that the next step forward, consequent on the recent signing of an agreement between UWI and USAID, was for a pilot which would determine the usefulness of telecommunications, at this time, for service for UWI in the Region. It was also emphasised that, for maximum benefit, any telecommunications system could only be a part of an overall delivery plan which would include the newer educational technologies as well as new approaches to the existing problems.

The workshop was very well received and took place at a most opportune time. It received good press and television coverage. The recommendations are given in Chapter Nine.

THE TELEPHONE TEACHING EXPERIMENT

A telephone teaching experiment was conducted in Jamaica during October and November 1981. Fifteen fully interactive one hour sessions were held using commercially available equipment with telephone lines connecting three sites by means of operator mediated

conference toll calls. The sites were located as follows:

- Mona Campus of the University of the West Indies, located in the South-East;
- Church Teachers' College (CTC) which is in central Jamaica;
- Sam Sharpe Teachers' College (SSTC) located in the North-West.

The experiment was designed to serve several purposes. First and foremost, it provided a hands-on demonstration of the use of the equipment and the possibilities of the technique to a large number of persons in the educational system. Secondly it was to serve as a method of initiating an even wider group into the use of telecommunications as an educational technology. The experiments also specifically examined:

- the adaptability of the teachers and students to this new medium;
- the quality of the telephone conference network for teaching.

The main equipment at each site consisted of a Darome Convenor teleconferencing system Model 1610. This system consists of a single small cabinet which contains the electronic circuits and loud speaker and a number (four are supplied) of "press to talk" microphones in a "daisy chain" arrangement. It incorporates voice switching between transmit and receive. The equipment is attached to the telephone system by a simple jack. The audio quality is very much better than that of telephone handsets. The programme originated from a room in the Senate House at UWI, Mona in which the only item of acoustic conditioning was a carpeted floor. The rooms at the other sites were unmodified classrooms.

The series were led by faculty members of the School of Education at Mona two specially invited guest tutors from the Ministry of Education, and the Principal of Mico Teachers' College.

Eighty-seven first year students received combined lecture and question and answer sessions once weekly in Education Units I and II. This constituted part of their normal curriculum and was fitted into their regular timetable. The sessions covered for example:

- The present structure of the formal education system in Jamaica including the Ministry of Education;
- History of the development from 19th century to date in terms of:

  (a) areas on which emphasis had been placed;

(b) funding and provisions;

(c) reasons for development;

(d) the kind of structure shaped by the Government for the management of elementary education in Jamaica.

The co-operating teachers and tutors participated in seminar type sessions on student supervision in general, particular subject areas and also discussed various administrative procedures. These programmes included:

1. administrative matters relating to the Joint Board of Teacher Education;

2. general supervision, attitudes, roles of participants;

3. evaluation of teacher training practice and particular evaluation forms. An evaluation instrument which was being introduced was discussed at length.

4. The following subjects were dealt with:

   (a) Mathematics - particular problems in teaching of approaches and attitudes for mathematics; the teaching of the Metric System was highlighted.

   (b) General Science, including the use that can be made of everyday materials to illustrate scientific principles.

   (c) Language - standard English as a different language from most children's normal medium of communication.

The final programme was a Graduation Ceremony.

Graduation

A graduation ceremony was held over the telephone network for the co-operating teachers and tutors at their request. Thirty-four certificates of participation were distributed for attendance at least 5 of the 7 training sessions held for this group. A few of the certificates were shared by different staff members of the same school, who had shared the programme according to the topic for the day and the particular interest of the teacher. About 55 individuals attended at least one session.

This exercise had many of the trappings of a normal graduation, including photographer, poetry reading and a guest speaker, Mr. E.M.V. Grant, the principal of Bethlehem Teachers' College. Mr.

Grant addressed the use of technology in education, the possibilities and costs, and the very high cost of failure to provide education, which could destroy the very fabric of society. He emphasised the need for maximising the use of scarce-resources such as specialised skills. Mr. Grant thanked the USAID for previous assistance in a range of educational activities and commended them for their foresight in supporting the CARCOST project.

The proceedings were recorded and a half hour long edited programme was aired by Jamaica Broadcasting Corporation's FM radio station during one of the University's regular time slots.

Co-operating teachers and tutors completed evaluation forms at this session. A summary of their views is given in Table 46.

TABLE 46 : PARTICIPANTS EVALUATION OF TELEPHONE TEACHING EXPERIMENT IN STUDENT SUPERVISION

QUESTIONS	RESPONSE	SSTC	CTC	TOTAL
1. How would you rate the overall programme in terms of your satisfaction?	Excellent	1	0	1
	Very Good	8	1	9
	Good	5	10	15
	Poor	0	0	0
	No Response	1	0	1
2. To what extent will it help you to improve your job performance?	To a large extent	7	2	9
	To some extent	10	12	22
	Very Little	0	0	0
3. Did you feel you had enough opportunity to participate?	Yes	10	3	13
	No	7	11	18
	No Response	0	0	0
4. If not, was this mainly because of technical difficulties?	Yes	3	5	8
	No	3	6	9
	No Response	11	3	14
5. Presuming that the technical delivery could be much improved, would you like to attend future programmes of a similar nature?	Yes	16	14	30
	No	0	0	0
	No Response	1	0	1
6. If so, what subject area would you be most interested in? (3 choices each)	Language Arts	10	7	17
	Science	13	5	18
	Mathematics	11	2	13
	Social Studies	1	3	4
	Education	1	5	6
	Reading	4	1	5
	English Lit.	0	2	2

	Home Economics	1	0	1
	Spanish	0	2	0
	Safety in Schools	0	1	1
	Music	0	1	1
	Supervision	0	3	3
	Classroom Management	0	1	1
	Measurement and Evaluation	0	1	1
	Early Childhood Education	0	1	1
	Special Education	0	2	2
7. Were the sessions held at a convenient time?	Yes	10	13	23
	No	7	1	8
	Suggestions	Morning Session		
8. Was the length of each session	Too Short	6	3	9
	Just Right	9	10	19
	Too Long	0	0	0
	No Response	2	1	3
9. Would you have preferred to attend for longer periods but less frequently?	Yes	14	4	18
	No	2	7	9
	No Response	1	3	4

10. Any other comments	Emphasise desire for more of this type of programme.	3	0	3
	Suggest advance outline to participants.	2	0	2
	Emphasise longer sessions preferred.	0	1	1
	Can be used for upgrading of lecturers teachers.	0	1	1
	Involve more colleges.	0	1	1
	Can have programmes among themselves.	0	1	1
	Emphasise need for better technical system.	0	3	3
	Generally good experiences.	0	3	3
	Good wishes for future experimentation.	1	2	3
	No extra comment.	11	1	13

From the response shown in the table and also informal discussions, the following conclusions are drawn:

1. training through this medium could be very well received provided that the quality of the physical delivery system is good;

2. teachers recognise the need for their own continuing education and are prepared to take advantage of the available opportunities;

3. participants would prefer longer sessions held less frequently due to both the expense and inconvenience of travelling;

4. the greatest interest is for the subject areas of language arts, general science and mathematics, however, a few sessions on less conventional or more specialised skills would be welcomed;

5. high interest could be expected from other groups of teachers.

Quality of the Conference Network

The Jamaica Telephone Company Limited operates a two-wire telephone system and used "patches" to interconnect the conference calls between the sites. Throughout the experiment, the telephone operators displayed a most commendable level of courtesy and effort. The technical and administrative personnel of the Jamaica Telephone Company made many suggestions and did what they could to get the system to work well. (Indeed they are still investigating some of the difficulties). Nevertheless, regretfully the line noises persisted on the existing network when all three sites were in use.

Church Teachers' College suffered most. Their participants were often unable to speak through the microphones because line noise sometimes "cut them out". They could however usually hear. This college also sometimes experienced a continuous low level hum. All sites on occasion had problems with syllable clipping, noises and uneven volume reception from each of the other two sites. Recent tests made by the Jamaica Telephone Company show excellent reception at the end of the microwave links. The problems are obviously not insuperable but a successful system might require specially conditioned lines and better conferencing hookups.

Conclusions

The experiment emphasised the value of hands-on work and demonstrations in a study such as the present. People who are not acquainted with the use of telecommunications do not really seem to be convinced by words, they need to be shown. These were shown and are now fully converted.

None of the lecturers had any previous experience with teleconferencing but despite the technical problems they adjusted rapidly and found no difficulties with the technique. The students reacted with enthusiasm although some of this might be discounted somewhat because of the novelty of the exercise. Students rapidly learned to accept audio as their major source of information, but stressed the need for a visual component. Certainly the level of user/receiver acceptance was high.

The interest and enthusiasm associated with the experiment need to be specially noted. The principals and staff were equally pleased. Some of the co-operating staff and tutors travelled as much as 35 miles each way to attend the sessions. The staff at both Colleges expressed great disappointment at the removal of the Darome Convenors

and their willingness to have them back for further use at any time.

The response has been so positive that the Colleges and the Joint Board of Teacher Education are now considering a larger network. The Telephone Company is continuing its study of the difficultiies encountered previously and a University team is examining the use of FM radio based on existing repeater towers. In all probability this experiment was like a seed planted on fertile soil.

OUTCOMES

It is clear that there is a very high degree of interest in the Caribbean in the possible applications of a telecommunications system in education, health, and agriculture. The mandate received by the University is somewhat open ended, subject primarily to two constraints:

1. those involved should be kept informed and allowed the opportunity to make inputs;

2. the University would be expected to find the funds initially required to develop a pilot to examine the effectiveness of distance teaching across the Caribbean.

CHAPTER NINE

POSSIBLE TELECOMMUNICATIONS APPLICATIONS AND AVAILABLE FACILITIES

Because of its regional nature and the large distances between its components a teleconferencing capability could have a very significant effect on many of the activities of the University.

Various other regional institutions, e.g. The Caribbean Examinations Council, the Caribbean Development Bank, the Caribbean Agricultural Research and Development Institute and the Caribbean Community, which have important links with the University could benefit from an enhanced University system, if sharing were possible.

This section reviews a number of programmes on which discussions have been widely held.

SUPPORT FOR ACADEMIC AND ADMINISTRATIVE WORK

Teleconferencing may for example:

1) Substitute travel for some formal meetings and facilitate a variety of administrative matters which must now await face-to-face meetings;

2) Allow regular consulations between various combitions of Senior Administrative Staff, Deans, Vice-Deans, Heads of Departments, etc.;

3) Allow inter-campus lectures, seminars and tutorials;

4) Contribute to academic matters by:

   a) making possible inter-campus discussions on courses, programmes, standards, etc. between teachers in particular subjects;

   b) allowing speedy finalisation of examination papers;

   c) facilitating the supervision of postgraduate work across the territories;

   d) increasing the "effective size" of University departments which on the average are rather small;

5) Contribute to the development of Extension Studies.

Some of these possibilities are discussed below:

Substitution for Travel for Formal Meetings

The University operates an inter-locking system of committees at several levels. Campus Committees report either to the Campus Academic Boards, or Finance Committees, which in turn report to the appropriate University Committees. The various University Committees, sometimes several steps removed, report finally either to the Council or to the Senate. Figures 7 and 8 summarise these reporting links to Council and Senate respectively.

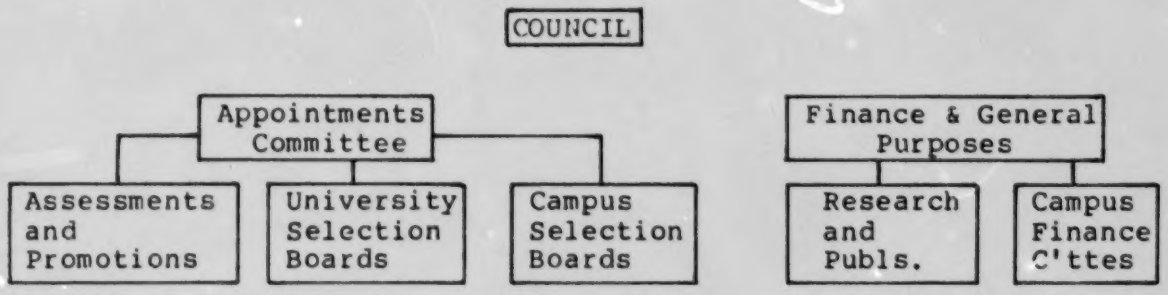

Figure 7: Council and Some Council Standing Committees.

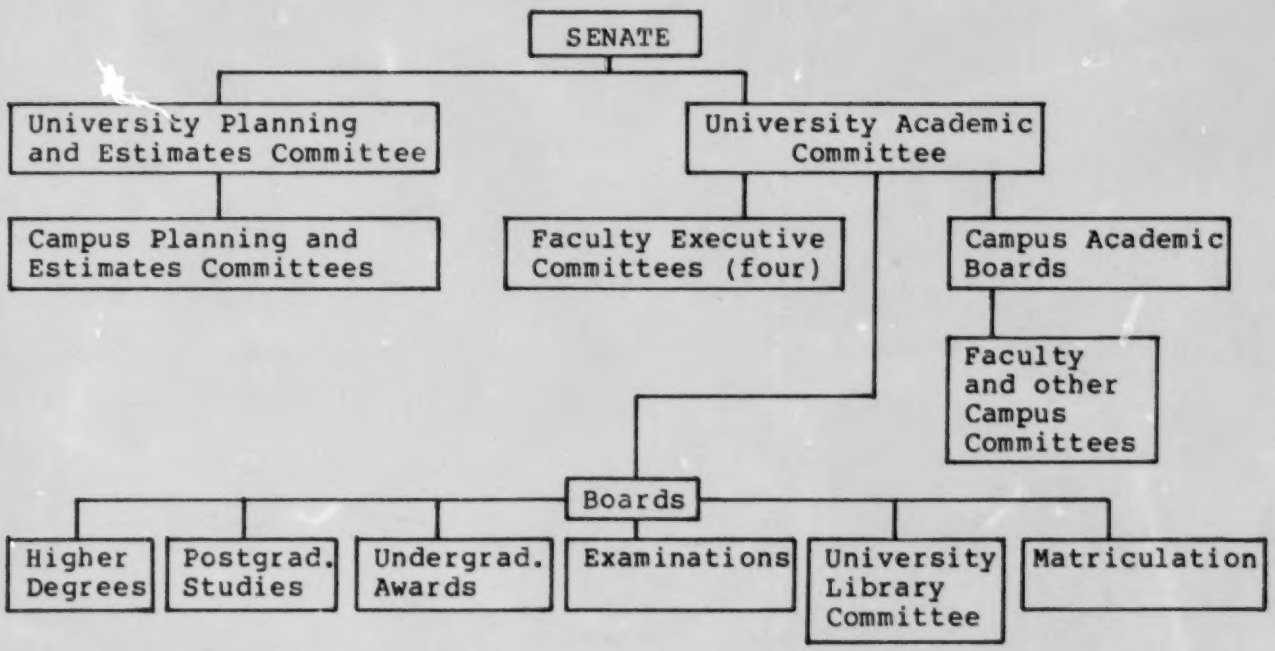

Figure 8: Senate and Senate Committees.

Some information on number of meetings, etc. taken from the schedule for 1980/81 is in Table 47.

Table 47: Frequency, Average Durations of Meetings and Approximate Numbers of Members for certain University Committees (1980/81).

Council and Council Committees

Committees and Boards	No. of Meetings	Duration of each Meeting	No. of Members
Council*	1	1-2 days	51
Finance & General Purposes*	5	1/2 day	33
Appointments*	12	1/2 day	20
University Selection Boards	160	1 hour	8-10
Assessments & Promotions*	3	2 days	26
Research & Publications*	2	1/2 day	22
Consultancy Committee	3	1/2 day	4
Senate and Senate Committees			
Senate*	1	1 day	143
University Planning and Estimates Committee*	5	1 day	37
University Academic Committee*	4	1 day	30

The University Academic Committee (UAC) is the Executive Board of Senate. A large number of Boards and Committees report to this Committee. Some information on meetings of the standing Committees and Boards of UAC is in Table 48.

Table 48: Meetings of Committes and Boards of University Academic Committee (1980/81).

	No. of Meetings	Duration of each Meeting	No. of Members
Faculty Executive Committee of:			
Arts & General Studies*	3	1 day	31
Natural Sciences*	3	1 day	19
Social Sciences*	3	1 day	25
School of Education*	3	1 day	33
Boards and Committees			
Examinations	5	1/2 day	18
Higher Degrees	4	1/2 day	24
Matriculation	2	1/2 day	21
Postgraduate Studies	3	1/2 day	21

Undergraduate Awards	1	1/2 day	21
University Library Committee	1	1/2 day	14

As it presently operates, the University system depends vitally on travel. Certain particularly important Committees confer on the membership the right to travel. These Committees are delineated with an asterisk in the Tables 47 and 48. The University calendar is arranged to take full advantage of meetings of these committees by scheduling other meetings during the same period. The result is that about five times per academic year, usually in November, December, February, May and July, a relatively large number of staff travel to one or other of the campuses for a period of about one week of extremely intensive committee work. The schedule is frequently made more difficult by the necessity of one committee having to complete its work to report to another during the same week.

COMMITTEES FOR WHICH TRAVEL SEEMS NECESSARY

Council and Commmittees of Council

Council and the Finance and General Purposes Committee both have a substantial non-University membership. The nature of their business and the manner in which it is conducted suggest that teleconferencing would probably not provide an adequate substitute.

The business of the Assessments and Promotions Committee might also be inhibited by the teleconferencing technique, although it would be applicable, to some aspects of the work of this Committee.

Senate and Senate Committees

The annual meeting of Senate receives reports from its Boards and Committees for discussion and the determination of academic policy. It is difficult at this stage to see this as other than a face-to-face meeting.

The University Planning and Estimates Committee and the University Academic Committee might be manageable as teleconferences, but it would seem better to exclude these Committees.

MEETINGS FOR WHICH TELECONFERENCING MIGHT SUBSTITUTE FOR TRAVEL

The administration of the University will require a significant amount of travel even if a teleconferencing facility is available. Obviously once travel is necessary, other activities would, as is now the case, be scheduled to fit in with the presence of a large number of University staff on a particular campus, but by shifting some meetings to teleconferences, the pressure on the main meetings would be reduced, and various timetables could be uncoupled. Also certain meetings might be held more frequently as necessary. There would also be speedy consultation across campuses even for meetings where travel is considered necessary. A number of possibilities for formal

teleconferences is discussed below:

Assessments and Promotions Committee

This Committee is required under certain circumstances to interview Heads of Departments. This frequently causes postponements of decisions and additional travel for relatively short interviews.

Using teleconferences as necessary for these interviews would be one of the most straightforward applications.

Appointments Committee

Because of its composition; Vice-Chancellor, Pro-Vice-Chancellors, Registrar, and Deans; meetings of the full Appointments Committee can be scheduled almost any time there is a series of major University meetings. But the business of Appointments Committee is not only often urgent, it is almost continuous. The Committee meets about fortnightly during the academic year and travel to this extent is clearly impossible. Although a system has been developed to deal fairly satisfactorily with the situation, teleconferencing would be of real value in speeding up the work of this most important Committee.

University Selection Boards

University Selection Boards recommend on appointments to the academic and senior administrative staff of the rank of Senior Lecturer or above. These Boards are usually scheduled to coincide, often in an extremely tight timetable, with other University meetings. Sometimes "write-in" opinions are solicited. The careful selection of staff is most crucial to the operations of the University. A teleconferencing system allows the possibility of calling the meetings as soon as the material is available and would ensure fuller participation by all campuses in the selection procedure.

Board for Higher Degrees

This Board held four half-day long meetings during the 1980/81 academic year. Its size and the nature of business makes its meetings easily adaptable to teleconferencing. Perhaps half of its work could be in this way.

Board for Examinations

This Board meets about five times annually. Two or three of these meetings might be carried out by teleconferencing.

Board for Undergraduate Awards

Since this Board usually meets only once annually, there is no strong reason to teleconference it.

Board for Postgraduate Studies

This Board met by teleconferencing during the Project Satellite experiment. The meeting was rated highly successful and the agenda was completed in record time. The Board's meetings are scheduled during one of the weeks of University meetings. The July meeting therefore deals almost entirely with the award of scholarships although the results of the current year's examinations are frequently not fully available. Postponement for a week or two would be ideal, but by then the members would have returned to their respective campuses. Teleconferencing would provide a solution to this difficulty.

Faculty Executive Committees

Faculty Executive Committees which comprise Deans, Vice-Deans and elected members would seem suitable for teleconferencing. These committees which synthesise the various campus positions and help set faculty policy for reporting to University Academic Committee, would possibly usefully meet more often if the constraint of travel costs and time were removed.

Meetings of Extra-Mural Tutors

The Extra-Mural Department is the most widespread of all sections of the University and its work is equally diverse. The ability to have regular teleconferences of all or most of the constituent units would enhance the programmes and quality of the work of this important section of UWI.

Increased Interaction between Departments and Faculties

With a total teaching staff of about 795 and 83 departments divided among three campuses, the average size of departments is necessarily rather small. A telecommunications system could increase the "effective size" from that of a campus to that of a Unversity. It would also admit sharing of expertise e.g. between engineering and physics; agriculture and biological sciences. Some specific examples are:

Agreement of Common Courses - "Meetings" of Teachers in a Subject

The University operates an academic system which involves a significant proportion of common courses and common examinations. Some consider this necessary to ensure high standards and that all graduates from whatever campus, enjoy a degree with a common seal of distinction. This ideal could be eroded by communications difficulties which would be lessened or largely overcome by teleconferencing.

Full inter-campus meetings of teachers of a particular subject are extremely rare, though they would be extremely valuable. There are some 536 members of the cross campus Faculties and about 61 courses are taught and examined. Obviously time and expense make close interaction between these large numbers by travelling impossible. The lines of local interaction are departmental meetings

and campus faculty committees. Outputs are synthesised by the Faculty Executive Committees for onward transmission and these lines do work. But what is still lacking is a real measure of interaction at the subject level for planning, curriculum development, agreement of courses, standards, etc. for Meetings of Teachers.

The academic staff feel the need for greater interaction and several requests have been made It would seem that a meeting of teachers of each subject say once every three years would be worth aiming at; and this is clearly impossible without a teleconferencing facility.

Inter-Campus Lectures

This seems an interesting possibility. Open and other special lectures would obviously be well worth sharing; but it may also be worthwhile to consider sharing the expertise on any particular campus in the normal programmes. Useful examples might be Food Science and Microbiology.

Supervision of Post-graduate Students

The University's postgraduate programmes provide the major basis for training and selection for academic staff. At the same time University research is increasingly being directed into areas of national and Regional interest. In these circumstances, not only is there need to increase the size of the postgraduate programmes, but also to increase the amount of work being done away from the Campus territories as indeed was requested by the Appraisals Committee and Council as reported ealier.

Agreeing Examination Papers

By January 31, each year, the examination papers for the cross-campus faculties: Arts and General Studies, Natural Sciences, Social Sciences and the School of Education, should have been deposited in the Registry ready for processing. It has in fact been very difficult to do this, and papers are frequently sent to the printers late. Consequently there is almost as much trauma in the Examinations Section as among the students as summer draws nigh and papers remain outstanding. A teleconferencing facility with facsimiles would go far towards removing bottlenecks. It would also be of great value in the case of non-arrival of examination papers at any particular site.

AGRICULTURE

Agriculture is of such importance to the Region that an enormous range of telecommunications applications are possible. A selection of these with focus on UWI activities is discussed here.

Degree Programmes

The Faculty of Agriculture can presently accommodate a larger number of students and many courses in the degree programme require laboratory and/or field work which would present difficulties for distance teaching. It, therefore, does not seem useful to consider degree programmes by extension at this stage. Some in-service programmes might, however, be useful if a suitable credit system were designed.

Research Co-ordination and Support

An active Regional research programme is necessary for agricultural development. An interactive communication system, particularly one with slow scan video capability, would facilitate the research efforts of the Faculty by making it possible for staff to readily supervise the research work of students away from the St. Augustine campus and would encourage co-ordination with the national research programmes. It would, in particular, strengthen planning, co-ordination, and joint research efforts with CARDI.

Diploma in Agricultural Extension

The proposed Diploma in Agricultural Extension, might be partially handled through a distance teaching system. The details of this programme have not been finalized, but much of the formal course work might be handled through a teleconferencing facility, especially if an in-service component were found to be important.

In-Service Workshops

For several years, the Department of Agricultural Extension has organised Regional Extension Workshops. These workshops last for two weeks and are well attended by extension workers. They perform a valuable staff development activity but are also expensive due to the Faculty and participant travel to the workshop site. A teleconference system would be useful for such workshops.

In-Service Teaching for Extension Officers

It was shown earlier that some 70 percent of the Agricultural Extension staff of the Eastern and Southern Caribbean perceived a need for additional training in technical subject matter and in extension. There is, therefore, a large pool of personnel who would presumably be available for in-service training programmes by distance education methods.

Expanded Outreach Programmes:

An expanded outreach capability is one of the major priorities of the Faculty of Agriculture.

An outreach programme based on telecommunications could support national agricultural systems by providing a fully or partially interactive medium for exchange of information on:

(a) transfers of new technology with critical reference to pre- and post-harvest developments;

(b) availability of new chemical substances;

(c) availability of new varieties, approaches, farming systems, etc;

(d) early communication of research results.

The outreach activities of the Faculty of Agriculture are being expanded in support of a USAID funded project to improve national extension systems in the Region. This expansion includes:

(a) placing full-time outreach staff members in Belize and Antigua;

(b) an expansion of the current activities of the Information Unit, including;

i) taping information and educational programmes for distribution to local radio stations for broadcast;

ii) developing audio-visual material and written scripts for use by extension workers in the region;

iii) the preparation and dissemination of a wide range of illustrated bulletins and pamphlets.

These plans would, of course, be much assisted by a telecommunications network.

Telecommunications could also greatly expand the range of the present extension newsletter and provide a significant measure of interaction. The transfer of information could include extensive use of audio-visuals.

For the remainder of this section, it is difficult to do better than quote verbatim the recommendations of the February, 1982 Workshop on Telecommunications in Agriculture in the CARICOM Region referred to earlier.

Recommendation 1

It was concluded that a telecommunications network between the University of the West Indies' Faculty of Agriculture and selected states of the CARICOM Region could make significant contributions to Agricltural development in the Region and it was therefore, recommended that the Faculty of Agriculture should participate in UWI Telecommunications Project together with other groups in Education, Health and UWI Administration.

Recommendation 2

Although many possible applications of telecommunications in Agriculture were explored, it was recommended that the Faculty should give priority to the following three areas in the development of its telecommunications programme:

(i) Education and Training;
(ii) Organized Teleconferences;
(iii) Information Distribution.

Recommendation 3

It was proposed that in the area of Education and Training, emphasis should be given to the following target groups:-

a) Extension Workers;
b) Agriculture Teachers in

(i) Teacher Training Institutes
(ii) Primary and Secondary Schools and Farm Schools.

Recommendation 4

It was proposed that regular, organized teleconferences might be conducted for six target groups as follows:

(i) Regular meetings of staff of the Caribbean Agricultural Extension Project;

(ii) Regional meetings of Chief Agricultural Officers and Chief Extension Officers;

(iii) Regional meetings of Specialist Officers involved in Research and Develpment Programmes;

(iv) Regional meetings of Field Extension Officers;

(v) Regional meetings of National Personnel involved in Information and Communications;

(vi) Regional meetings of Teachers involved in teaching "A" level Biology and Chemistry courses in Secondary Schools. The significance of the use of slow-scan television in this exercise was emphasized.

Recommendation 5

It was proposed that activities in the area of Information might

give attention to upgrading the state of market intelligence for both Regional and International Marketing. Attention was also drawn to the fact that a considerable amount of printed data might be transferred to Ministries by the use of facsimile transmission and audio tapes during out of work hours, e.g. 9.00 p.m. to 6.00 a.m.

Recommendation 6

It was stated that for full testing of the potential of telecommuncations for Regional development, it was essential that ground stations be also located in Antigua and Belize. If currently available project funds could not meet this requirement, then funds should be sought elsewhere for these ground stations.

Recommendation 7

It was suggested that due attention be given to participation of women in the telecommunications in Agriculture programme, in view of the significant role played by women in Agriculture in the Region particularly in the area of marketing.

HEALTH

There are many possible uses of a medical telecommunications system in the Caribbean. A number of possibilities are discussed in this section.

Consultation

Several NCCs assert their needs for consultation. Consultation sessions could be arranged by teleconferencing. Details of the relevant cases could be delivered over the network to the consultant(s) who could respond at pre-arranged times. General participation by all territories in some of these sessions would probably be advantageous. Information available for discussion may include x-rays, ECGs, etc.

Consultations could be used:

(a) for primary care - para-professional to physicians;
(b) for secondary care - between physicians and specialists;
(c) supervision of para-professionals and trainees;
(d) direct patient care;
(e) administration and management.

Consultation for Primary care

Good internal communications are aimed at by all territories and improved communiations by telephone and by road should place medical attention within the reach of most persons. The use of telecommunications, for primary care may be useful but this would in all likelihood be a national service using telephones and/or radio rather than a Regional service.

It is technically possible to provide some primary care type consultation throughout the Region from a central system or to share the facilities of various territories, but it is doubtful that there would be much enthusiasm for such a system.

Consultations for Secondary and Tertiary Care

At the secondary care level, there is a similarity of medical problems and teleconsultations are likely to be welcomed.

In a tertiary referral hospital almost all the patients would benefit from inter-physician consultation. A pilot survey of recent admissions to the medical wards of the University Hospital of the West Indies showed that approximately 35 percent would benefit from sub-specialty consultation. If one assumes that 1/4 of that number of consultations would be highly desirable, this gives some idea of the number of occasions on which physicians from small acute general hospitals might wish to consult with other physicians in a tertiary care institution.

But often the necessity for consultation is determined by the results of laboratory investigations. The absence of adequate diagnostic facilities in the small hospitals of the Region will severely limit the extent to which physicians in those places will opt for consultations. In many instances, however, the need for consultation is to get access to diagnostic facilities rather than to solicit expertise to help with the solutions of a clinical problem. Thus the ability to transmit data such as X-ray photographs, ECGs, etc., should be an important component of any system. There is also the possibility of examining slides and doing some visual examinations by, for example, slow scan television.

Only one of the NCCs has a trained Dermatologist. There are two in Jamaica, two in Barbados and three in Trinidad. Availability of visual communication in this speciality would therefore improve patient care and also stimulate inter-professional contact.

A teleconferencing facility might also allow access to expertise in countries outside the Region. There has been a continuing exchange on this subject with University of Colorado Health Services Centre. One suggestion of theirs* is that a powerful new diagnostic instrument, the computer tomograph could be split into an inexpensive patient gantry containing the complete X-ray units and photo tubes, each of which could be located in one of many communities. These "inexpensive" units would be linked by satellite to a single large main frame computer, where diagnosis and archiving would be done. The CT image and its interpretation would be fed back on line to the hospital in the Caribbean. The proposers see in this a much more powerful and versatile system than is the case with any conventional system and state that "The cost saving and effectiveness to CT scanning is enormous".

*Correspondence between Dr. D.G. Whitlock and Professor G.C. Lalor

The Denver region has a very powerful earth station which could be the main link in a UWI-Colorado association.

Improving Patient Care Directly

One area which might benefit is organ transplantation. For example, there ought soon to be one or two renal transplant centres in the Region. A good telecommunications and regional computer system would considerably enlarge the pool of probable donors with definitive treatment of greater numbers of patients.

Disease Surveillance

The Caribbean Epidemiology Centre carries out communicable disease surveillance in the Region and has already demonstrated the usefulness of rapid inter-country communication. Rapid methods of communication about disease patterns are increasingly important as travel increases.

Research

Inter-territory collaborative research has rarely been practical partly because of difficulty in communication. Telecommunications linked to central computer facilities would open the door to research using larger population samples. For example, research on chronic diseases like cardiovascular disease is being undertaken in several territories. The value of this could be enhanced by the use of identical protocols with rapid data transmission and central analysis.

Education of Medical Students

A large part of the second year of the internship could be spent in a non campus territory . A telecommunications system would allow wider dispersal of the graduates through the Region - a move which would certainly be welcomed by those territories in which the personnel available for close supervision is limited. Also the students may well benefit from some study in an environment similar to the one in which they will practice.

Continuing Education for other Health Workers

It is very difficult if not impossible, for any large number of health workers to leave their posts to upgrade their skills. But every territory has at least one general hospital and established clinics which can provide focal points for continuing education for all categories of workers. There are many different forms of continuing medical education programmes, but most of these are adaptable to dissemination via a telecommunications system.

Seminars and Conferences

These forms of continuing education would allow for frequent exchange of knowledge and allow the professionals of the Region to keep in touch and provide a regional flavour for discussions of the

development of health priorities and services. There are already series of seminars, e.g. Seminars for General Practitioners and Clinico-Pathological Conferences on the Campus territories which would form the basis of this programme.

Allied Health Training

At a consultation in Barbados, in March, 1979, among designated officials of NCCs Ministries of Health, five year projections of training needs were defined. Present needs should hardly differ from those of 1979 which are summarised in Table 49.

Table 49: Summary of Requirements over a five year period for Basic Level Training in the NCCs.

Category	No. to be trained	Territories in need of 5 or more
Public Health Inspectors		
Basic Level	57	all excluding Montserrat
Health Records and Statistics		
Basic 1	24	only Belize
Basic 11	9	
Laboratory Technicians	18	Dominica, Grenada, St. Lucia, St. Vincent
Radiographers		
X-ray Technicians	12	
Diplomas	12	
Pharmacists	23	St. Vincent
Dietetic Tehnicians	8	
Physiotherapists	8	
Community Nutritionists	8	
Food Service Supervisors	18	St. Lucia
Dental Auxiliaries	30	Belize, St. Kitts/Nevis, St. Vincent

This table shows the familiar pattern. The total number to be trained is quite significant (227), but is divided among some one dozen sectors and frequently only a few territories have a requirement for five or more in any one area. The greatest numerical need is for training of Public Health Inspectors, next come Dental Auxiliaries and

armacists.

Table 50 details requirements for post-basic level education/training for the NCCs.

Table 50 : Requirements for Post-basic Level Education/Training.

Country	Requirement	No to be trained
Antigua	Dip. Com. Health	2
Belize	Dip. Com. Health	2
	Tutors/Administrators	5
Dominica	Dip. Com. Health	3
	Tutors/Administrators	7
Grenada	Dip. Com. Health	1
	PHI. Tutor	1
	Pharmacy Tutor	1
	Other Tutors/Administrators	5
Montserrat	Dip. Com. Health	1
	Tutors/Administrators	2
St. Kitts/Nevis (1976 estimates)	Dip. Com. Health	3
	Tutors/Administrators	6
St. Lucia	Dip. Com. Health	5
	PHI. Tutor	1
	Pharmacy Tutor	1
	Other Tutors/Administrators	21
St. Vincent	Dip. Com. Health	4
	PHI. Tutors	2
	Lab. Tech. Tutors	2
	Pharmacy Tutors	2
	Other Tutors	6
Total		83

The total is again quite significant, but the individual requirements seem hardly large enough for conventional institutional training methods to be feasible. As usual, the alternatives are to :

(1) send the individuals for training elsewhere;

(2) develop a programme using itinerant teachers;

(3) develop some form of distance teach.

No doubt a mix of all these is possible depending on the particular circumstances. The second and third alternatives do have the advantage that they offer better possibilities for in-service training. Training for the Allied Health professions seems to represent a situation which is made to order for distance teaching, but the details of any actual programmes require fuller discussion with Ministries of Health, various educational institutions and the Pan-American Health Organisation.

THE DEVELOPMENT OF EXTENSION STUDIES

As detailed in Chapter Four, the need for extension studies has long been noted and indeed a preliminary programme and structure were drawn up and approved over ten years ago. Since that time, the need for training has probably increased both in the non-campus territories and on the campus territories. But any expansion of undergraduate student numbers will require substantial capital investment as most facilities on each campus are now saturated.

At the same time, however, the number of candidates applying for certain fields continues to increase and the non-campus territories are asking for facilities in their own territories. The increasing cost of formal education and the requirements for training for persons who are already in a post and cannot be released, all combine to emphasize that now is an excellent time to assess how telecommunications and educational technology can contribute to an Extension Programme. The Challenge Examinations system seems best suited as a beginning, but there are many other programmes which ought to be considered soon thereafter if not simultaneously. These would include various Certificates in Education and In-service Diploma in Education programmes.

Distance Teaching and the Challenge Scheme

Because the Challenge Examination System is a practical step towards an Extension System, because some of the system is already in place, and because it has already won a measure of acceptance with the Governments, within the University and among candidates, it merits consideration as the core of a University of the West Indies Extension System.

A survey of the UWI Resident Tutors revealed a great deal of interest in using distance education techniques. Seven of the nine Resident Tutors from territories offering Challenge Examinations responded, and were unanimous that distance education would be warmly accepted, particularly if an interactive system were used. Some projections based on figures provided by Resident Tutors are given in Table 51.

Table 51 : Projections of Challenge Examination Enrolment.*

	1982/83	1983/84
Antigua	25	30
Bahamas	6	10
Belize	5	10
Dominica	15	25
Grenada	15	20
Montserrat	17	20
St. Lucia	25	30
St. Kitts/Nevis	45	50
St. Vincent	12	15
Total	165	210

*The Campus Territories would add very significant numbers if the programmes were carried out there.

The estimates encourage consideration of a distance teaching programme but there is a much greater market. The total population of the non-campus territories contributes only about 8 percent of the student numbers at the University . Were the enrolment from the non-campus territories proportional to population, there should be over 1,500 students. On the basis of "O" level results, some 440 students qualify each year for entry to the University. At present admissions are very much smaller. Therefore, it seems reasonable to project that many more students would participate in a scheme which provides tuition even if it were limited initially to a single faculty. Neither the nature of the courses nor the number of students seem likely to be constraints.

But this is by no means the full story: The courses presently examined in the scheme include all those necessary for completion of the first year in the faculty of Social Sciencs and thus lead to degrees which include specialisations in Management Studies, Economics and Accounting, all of which and particularly Management Studies, are assiduously sought after.

Already there are Part-time and Evening programmes and the number of applicants is overwhelmingly larger than the number of places. A challenge distance programme would therefore also ease somewhat the situation on the campus territories.

Teaching for the Challenge Examinations should therefore be given the highest priority in any consideration for extension studies.

Courses which have been offered in the Challenge System

Candidates are allowed to sit the examinations for the following courses:

EC 101 Elements of Economics

GT 102 Introduction to Politics

SY 103 Elements of Social Structure

EC 104 Mathematics and Statistics

EC 105 Statistics and Scientific Methods

EC 214 Basic Mathematics for Social Scientists

MS 106 Elements of Accounting

H 100 History of the Caribbean

H 101 Foundations of New World History

E 100 Introduction to Literature in English

UC 100 Use of English

For students in the Faculty of Social Sciences, the first three courses are compulsory. Two additional courses are required for the completion of Part I and are selected according to the degree programmes desired. One of these must be EC 104, EC 105, or EC 214. The Statistics for EC 104 is the same as that for EC 105. The other course is selected from MS 106, H 100 or H 101; of these MS 106 is most often selected.

For the Faculty of Arts and General Studies programmes now being introduced, H 101 is a compulsory course for degrees which include History, while E 100 is compulsory for those degrees which include English. UC 100 is a University course which is compulsory for all degree programmes. Any or all of these courses would be suitable for a distance programme.

SY 103 and UC 200 are required courses for both the Certficaate programmes and advanced nursing training which are discussed later.

CERTIFICATE IN EDUCATION

The Certificate in Education is a one year course designed mainly for experienced practioners.

A Certificate is awarded in each of the following:

1. administration of schools
2. the teaching of the deaf
3. the teaching of mathematics
4. the teaching of science other than mathematics
5. the teaching of English
6. the teaching of social studies

7. the teaching of creative arts
8. the teaching of reading
9. the teaching of Spanish
10. educational management and administration

and in any other professional area approved by the School of Education.

Qualifications for Admission

To be eligible for admission to the course a candidate must:

(a) have been a successful internal student in an institution for teacher education for a minimum period of one year and have had three years subsequent approved teaching experience;

or

(b) have had ten years of satisfactory teaching experience provided that, although he has not been an internal student in an institution of teacher education, he has been declared to be a qualified or certificated teacher by the competent authority in his country.

Course of Study

The course of study extends over one year and is divided into two parts:

(a) Foundations of Education - embodying aspects of the Philosophy of Education, Psychology of Education and one or more of aspects of education as approved by the School;

(b) Studies in the particular field in which the Certificate is to be awarded.

Advantages of Certificate Programmes for Distance Teaching

The main stream of entry into the teaching profession is through the Teacher Education Colleges. Both in terms of the important jobs they do and because of sheer numbers, consideration of the needs of this group must be included in any discussion on upgrading education in the Region. The Certificate programme is one obvious way to do this. Although a fair number of awards of certificates are made each year an in-service programme would attract many more candidates.

The course arrangement also lends itself to a single core programme which would service a number of specialities. With a

suitable credit system the core programme itself might attract many candidates even where the particular desired speciality might not immediately be available.

Possible Certificate Courses

There are presently a number of one year Certificate courses and more can be added as the need arises so that the choice could be very wide. The Certificate courses for teachers of the deaf and teachers of mathematics are recommended initially because of:

(i) the possible impact on education and educators;

(ii) the valuable experience which they would provide for the distance teaching programme;

(iii) these are on-going courses so there would be no need to design nor find staff for a completely new programme;

(iv) some expertise and equipment are available in most territories for local tutors and field work.

Certificate of Education - Teaching of the Deaf

Special education has been treated in Chapter Six. A distance teaching programme in special education should initially concentrate on the training of teachers of the deaf because of the University's experience in this field and because there is a core of resource persons in schools, teachers colleges and voluntary agencies throughout the Region. Consideration of similar programmes for other aspects of special education should be continued. These could possibly be introduced after a few years.

Description of Present Programme

Entry to the present one year programme is based to a large extent on experience in the teaching of the deaf. The course activities are as follows:

(a) Foundation Courses - Lectures and Tutorials for:

- approximately 90 hours

(i) ED 400 Psychology of Education
(ii) ED 402 Philosophy of Education
(iii) ED 450 Curriculum Development

(b) Specialist Courses - Lectures and Tutorials for:

- approximately 120 hours

(i) Language and speech

(ii) Audiology
(iii) Sign Language
(iv) Testing and Evaluation

(ii) Field work in Group Teaching, Observation of specialities and demonstrations
15 - 20 days

"Clinic days" and where Students conduct screening tests both at clinics and regular schools for approximately 20 hours.

(iii) Teaching Practice

Preparation - 1 week
Actual teaching - 5 weeks and
Speech Practice - both individual and group speech training are practiced - 2 weeks.

(c) Written study incorporating the foundation subject areas.

THE DISTANCE PROGRAMME FOR TEACHERS OF THE DEAF

Location of the Programme

The non-campus territories which have shown particular interest in obtaining training are: Antigua, Belize, Grenada, St. Kitts, St. Lucia. There would also be significant interest among the teachers in Jamaica and possibly in Trinidad.

Course Curriculum

The curriculum should be modelled on the present Certificate of Education. The teachers need also to be trained to work with and to help the parents of handicapped children to help their own children.

Strategies for Programme Delivery

The course would be of about one calendar year's duration. The key delivery medium would be a telecommunications network but this would be supplemented by audio-visual and print materials, local supervision and demonstrations, etc. Video tapes would be a particularly powerful medium for this work and the delivery system should include interactive transmissions of slow scan television or other graphic techniques and facsimile.

The lectures and some field work can be started in August of any one year and a day release component can be introduced when the normal school year starts in September. The actual field work could be reduced to about 10 days - (the students will be working in a similar situation) as follows:

Group teaching practice	-	5 days
Demonstrations	-	2 days
Special Schools	-	2 - 3 days

Actual interactive time using interactive audio supported by slow scan television as required, is expected to be about 1/3 of the contact hours during the full time course. However, the students will need more time in order to study from video tapes, do assignments and private study. The total interactive time might be 100 hours.

The teaching experience component would be obtained on the student's job with some inputs from the School of Education. The quality of the teaching work could be assessed by a local tutor.

The outline for the written study can be collected by the beginning of January and completed by July, with the guidance of local tutors. The written reports on these studies carried out by students would help provide data and information for documentation and use in later years.

Study Centres and Specialist Facilities

The study centres would be at the UWI Centres in each territory. Certain minimum facilities in terms of specialist equipment would have to be assured. An absolute minimum would be: audiometer, speech trainers, sound level meter, toys - jingles, drums, triangles and bells, hearing aids - both individual and group.

These are items which should in any event be available in each school.

Local Supervision

The suggested minimum requirements of local tutors are trained teachers with at least three years experience as a specialist teacher.

Faculty

Teachers can be drawn from the School of Education and the Faculties of Medicine and Social Sciences. There are many other sources such as Mico, other teachers' colleges, and the voluntary organisations.

Certificate in Education - Teaching of Mathematics

The teaching of mathematics is notoriously inadequate throughout the Region. As a result of this, students frequently lack numerical skills and acquire attitudes of hopelessness and defeat which prohibit advancement in this important area. The present certificate programme in the teaching of mathematics if widely extended by in-service teaching, could make a significant impact on these deficiencies.

The course activities for the present one year programme are as follows:

(a) Foundation Courses - lectures and tutorials - approximately 120 hours

(i) ED 400 Psychology of Education;
(ii) ED 402 Philosophy of Education;
(iii) ED 404 Education and Social Development;
(iv) Either Ed 450 Curriculm Development; or ED 430 Administration;
(v) ED 409 Introduction to Classroom Testing.

(b) Specialist Area

ED 490 Methods and Teaching of Mathematics

(i) Lectures and tutorials - approximately 120 hours

(ii) Field work including group teaching practice and demonstration - 15 to 20 days

(iii) Teaching Practice

Preparation - 1 week
Actual Teaching - 5 weeks

(c) A written study incorporating the foundation subject areas.

Proposed Programmes

The Teaching of Mathematics Programme could be taught over one calender year using distance teaching techniques. The lectures and tutorials can be started in August to coincide with any other Certificate course. A day release component can be introduced when the normal school year starts in September.

The teaching practice component would be the student's normal job and the quality of work can be assessed from say January to May by local tutor.

The outline for the written study can be collected by the beginning of January. The completed study should be available by July. Guidance and assistance can be provided by the local tutor -as well as by telecommunications.

Facilities

No special facilities would be required for this programme but interactive graphics would enhance the quality of the offering. The teaching aids required would include library books, other printed materials, audio visual equipment and tapes.

Teleconferencing Time

It is expected that a one calender year course might involve:

Interactive sessions for foundation course (shared with other Certificate programmes)	40 hours
Interactive sessions for specialist courses	40 hours
Interactive sessions amongst tutors	10 hours
Training of tutors and administrators	10 hours
Total	100 hours

Since several foundation courses are common to other Certificate of Education programme, there could be some overlap in the time slots.

Locations of the Programme

All the territories could benefit from such a programme. The choice of locations would depend on what other distance teaching programmes were offered. There is considerable overlap in the certificate programmes which would reduce the cost of a distance teaching programme.

ADVANCED NURSING EDUCATION

The one year long (one academic year plus the summer vacation) Certificate courses in Nursing Education and in Nursing Administration seem appropriate for a distance programme because the need to upgrade both tutors and administrators is apparent and also because there is a large number of potential students with both the interest and the academic entry requirements.

The Present University Programme

Qualificaions for Admission

To be admitted to the prescribed course of study for the Certificate in Nursing Education and in Nursing Administration, candidates must satisfy at least one of the following:

(i) University minimum entrance requirements are not mandatory, but preferable; however, persons who are over the age of 30 years, may be admitted on the basis of their overall academic and professional attainments.

(ii) have qualified in General Nursing and be registered by the appropriate registering body of the country in which they are practising, and normally have had not less than 3 years experience in nursing as a qualified nurse;

(iii) be recommended by the candidate's Government or recognised educational body; but other candidates may be considered.

All candidates applying for admission to the Programme must take an entrance examination set by the Faculty in which this programme is assigned, unless exempted by the Senate on the recommendation of the Faculty.

Course of Study

Both certificate programmes have the following courses in common.

(i) The Use of English*
(ii) Psychology
(iii) Perspectives in Nursing.
(iv) Elements of Social Structure*

The other courses are:

(a) The Certificate in Nursing Education

(i) Principles and Philosophy of Education
(ii) Field Practice and Study (Practice Teaching and Project).

(b) The Certificate in Nursing Administration

(i) Administration Techniques
(ii) Field Practice and Study (Field experience in administration and Project).

Proposed Programme

The course might best be taught as in-service day release since nurses tend to work on shift and have very full working periods. A duration of two years seems reasonable. Three of the Lecture/Tutorial subjects can be presented during the first year and the others added during the second. In most territories there should be sufficient nursing expertise to provide local tutors.

POSSIBLE APPLICATIONS BY THE CARIBBEAN EXAMINATION COUNCIL (CXC)

The Caribbean Examination Council is becoming the principal agency in the Region which prescribes syllabuses, sets school leaving examinations and awards certificates based upon such examinations. It will eventually replace the existing Cambridge Ordinary Level GCE examination with an indigenous Caribbean Secondary School Leaving examination that will cater to a much wider population.

*These are also Challenge Examination courses.

The Council has developed and is continuing to develop new syllabuses in the attempt to direct the educational processes along a more realistic and relevant path while maintaining high standards. This has caused even the most competent teachers to be faced with programmes and modes of assessment for which they have not previously prepared. Particular problems exist with the new Integrated Science subject and with the single science subjects (Biology, Chemistry and Physics) which will be coming on stream shortly.

Deficiences in Science Teaching

Science teaching has not been of the highest quality. A part of the reason this is that because of the shortage, teachers frequently become responsible for either:

1. a science subject which was not their principal discipline, or

2. multiple science subjects;

and therefore will not normally have the required depth of knowledge in the subject area for which he/she is responsible. pp The problem is particularly severe with Integrated Science, which is new, and few if any Caribbean graduates have been trained to deal with such multi-disciplinary courses; some sections of the syllabus content will not have been included in the teacher's university training.

Workshop Sessions

CXC has been attempting to bridge the gap in content and methodology referred to above by mounting workshops, but many more training sessions are needed for the teachers of Integrated Science and also for the introduction of the single Scince Subject curriculum.

There are presently 38 teachers of Integrated Science in the Regional Pilot project of whom about 15 are located in Guyana, which is a participating territory in CXC though not a contributing territory to the UWI. Some additional science teachers including those who teach single science subjects would probably wish to attend workshops. The CXC has suggested the following ways of applying telecommunications to the conduct of workshops:

Alternative 1

Science teachers and resource persons would meet for a week long intensive workshop during the summer vacation. Those resource persons who are required to contribute at the workshop for short periods only may have their sessions presented by use of the communications network.

Alternative 11

The Science teachers would meet at the Extra-Mural or other location in their territories for three or four hours each week for six to eight weeks. A modular approach in which teachers complete an agreed unit of work each term might be adopted. This scheme would include the use of an interactive communications network for about 2 hours weekly. Audio and video tapes, experiments and group work would also be an important component.

CONTINUING EDUCATION FOR PROFESSIONALS

There appears to be but marginal interest at this time by professional organisations in areas like accounting, engineering*, law or medicine for continuing education within a distance education system. Perhaps as the system develops more interest might develop but in the absence of a compulsory recertification programme the interest seems unlikely to be significant. Likewise there seems little desire for university level instruction for the general population at this time. It is in any event difficult to see how such programmes might be funded.

INTRA-TERRITORIAL NETWORKS

The previous sections of this Chapter have been discussing possible Regional applications, but it has become clear that local networks also offer many possibilities not all of which would necessarily involve UWI. The interest in an intra-territorial network devoted to education is greatest in Jamaica. The most likely programmes appear to be:

1) In-service Diploma in Education training;

2) Support for Development of Teachers' Colleges;

3) Distribution of any or all inter territorial programmes.

In-service Diploma in Education

There are currently 700 graduate teachers in Jamaica's Secondary Schools (mostly high) needing upgrading in the educational component of their training and about 200 graduates from the Faculties of Arts, Natural Sciences and Social Sciences join this group each year. The total enrolment in Diploma of Education Courses at Mona has been of the order of 100 each year over the last three years so that the ratio of Diploma holders will increease with time. Obviously if

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* The engineers have at various times expressed some interest in the establishment of local or regional centres through which some continuing education could be carried out The UWI Faculty of Engineering has been active in continuing education and would probably support an expansion in this field.

pedagogical training is considered to be essential, a completely new strategy is required to train these numbers, but even if funds were available the school system could not sustain the absence of numbers of teachers of the order of 300 per year.

Nevertheless an in-service programme such as the present one in which students are required to attend lectures at Mona during most of the vacation periods and also every Friday or every other Friday during the academic year; do their reading and writing in the evening; and carry a heavy teaching load maintaining full responsibility for their classes has not been too successful. The burden on the student is so heavy that there is a high dropout rate.

Various models for providing in-service diploma level programmes have been prepared by the School of Education for consideration by the Ministry of Education; one of these includes a distance teaching educational component. This is at present under discussion.

SUPPORT FOR THE DEVELOPMENT OF TEACHERS' COLLEGES

The Teacher Education Development Section of the School of Education at Monat has responsibility for all the teachers' colleges and departments in Bahamas, Belize and Jamaica. Thirteen of these colleges are in Jamaica, one in Belmopan, Belize and one in Nassau, Bahamas. Because of the distance involved, there is much less participation by the overseas members and this section will concentrate on Jamaica's requirements. If, however, Belmopan and Nassau are included in a network as is suggested in Chapter Ten, the Bahamas and Belize could benefit from all the programmes.

The teleconferencing network would be used for teleconferences, for a limited number of lectures to students and for the training of college staff as follows:

Teleconferences

The Teachers Education Development Section is involved in a number of meetings with staff from the colleges. These meetings are usually held at Mona primarily because:

(a) the largest concentration of teachers' colleges is in or around Kingston;

(b) the University of the West Indies facilities are uses.

The travelling cost (Jamaica's participants only) is between J$1,000 and J$1,500 per meeting, but in addition there is the real, though unquantified cost of staff members being absent from lectures or other duties.

The establishment of an interacctive telecommunications network on which a proportion of these meetings may be held would eliminate

the travelling time for the participants to attend those meetings if a site is at their college and reduce the time for many others. Specific suggestions are:

Joint Board for Teacher Education

The members of this board are the principals of teachers' colleges, two additional staff members (who rotate between colleges), University Faculty members, and four members drawn from the public at large. The present arrangement effectively restricts the last group to persons normally located in Kingston. This board holds about six meetings per year. Most of these meetings could be teleconferenced.

Boards of Study of the Joint Board of Teacher Education

Each of the eighteen subject areas taught at the Teachers' Colleges departments has a Board of Studies. A Board of Studies on a particular subject is composed of all members of staff who teach that subject.

Each board has the following minimum numbers of meetings per year and the average meeting time is estimated to be one day.

(a) Development of the subject area - 3

(b) Examination related to other business - 2

Some of these meetings could be teleconferenced and the network would allow communications to facilitate the preparation for meetings and consequent follow up. At this time some of the colleges are accessible only by visit or post.

TEACHING

It is not expected that a great deal of teaching would be aimed at, using the network, but initially there are areas which could benefit, such as:

(a) areas which require a highly specialised competence;

(b) assistance to colleges which are suffering from a temporary shortage of staff;

(c) information programmes on aspects of the educational system.

IN-SERVICE CONTINUING EDUCATION

This would be a boon to many members of staff particularly those living and working in relatively isolated districts.

The programmes would aim at the following:

(a) to upgrade competence in particular subject areas. This is most important because many staff members teach subjects in which their own training is not considered strong;

(b) the provision of "refreshers courses" for experienced teachers. This would emphasise both a review of certain areas and studies of new developments in particular subject areas;

(c) the determination of syllabus contents and direction. This would facilitate the standardisation of courses and help ensure the teaching of exactly what was intended by the designers of the syllabuses. It would also provide a feedback mechanism for altering syllabuses.

(d) to train teachers for the introduction of new courses.

(e) providing formal education programmes certified by the University. These programmes for the Region have been described previously and could be offered over a local network.

There is real enthusiasm in Jamaica for a local network to distribute programmes sch as described above. Discussions on the availability of local funding will begin shortly.

FACILITIES RELEVANT TO A UWI EXTENSION PROGRAMME

The University is served by a number of facilities which could contribute to any extension programme. These include Libraries, Documentation and Computer Centers, Audio-Visual and Print Media Facilities, the University Centres and Electronics Maintenance Units.

A. LIBRARIES

The University Library system consists of one main library on each Campus and additionally at Mona two branch libraries. The Library supports the University's work in the usual way by the provision of text books, monographs, journals and information services. The library is also the prime depository for the principal research collections in the Caribbean Commonwealth.

B. COMPUTER CENTRES

The University has three computer centres, one on each campus, each with a main frame computer and auxiliary equipment as well as a number of mini- and micro-computers in various Departments. The

University computer centres have at present no inter-campus compatibility, but there seems to be no fundamental reason why appropriate hardware and software inter-computer links could not be established.

Cave Hill operates an ICL 1901A with 16K words which will probably be replaced by a superior unit shortly.

Mona operates an IBM 370/138 with 1 megabyte core. On line terminals are being installed.

St. Augustine operates an ICL 1901T which is being replaced by an ICL ME 29.

C. PRINT AND AUDIO-VISUAL FACILITIES

Cave Hill

Learning Resource Centre

The Learning Resource Centre at Cave Hill is small though well equipped multi-purpose facility with:

1) an audio-visual library of 460 sq. ft. with carrels and tables to enable both individual and group use;

2) A curriculum/seminar room of 600 sq. ft. to provide for group discussions, seminars, display and video viewing;

3) a VTR studio of 526 sq. ft. with a small control room;

4) a graphics room and dark room for a small production team in graphics/ photography;

5) a technician's room;

6) A small offset printery.

Mona

University Printery

The University Printery meets the printing requirments of the Mona Campus. The staff consist of a Manager/Lecturer and other full-time staff heading the following sections: Design and Layout, Graphic Art, Typesettng, Lithography, Plate-making and Press.

The equipment includes: an electronic composer, 5 offset presses and one letter press, 2 cameras, one for black and white photography

and one for colour separation, 2 plate burners, and many other major items.

The University Printery has the capability to deal with at least the major portion of the print requirements of any likely extension programme.

Medical Learning Resource Unit

The Medical Learning Resource Unit (MLRU) provides for the audio-visual requirements of the programme of the Medical Faculty on all the Campuses. It is located in the Postgraduate Medical Education building. It has a graphics and photographic facilities. The unit produces slide/tape presentations and monographs.

The production staff consists of a director, a graphic artist, and the photographers of the Faculty photo unit. It is envisioned that MLRU will develop a wide range of teaching/learning materials for students and health personnel.

Radio Education Unit

The recording studio of the Radio Education Unit (REU) has a Philips console, high speed dubbers, turntables, reel to reel and stereo cassette recorders. These facilities enable the unit to produce radio programmes, and the audio portion of audio-visual presentations.

Media Production Centre, School of Education

The School of Education at Mona has limited print and video production facilities. These include a viewing room, a technician's work/store room and a graphic artist and typesetter. The staff consists of an educational technologist, technician, graphic artist and typesetter.

Institute of Mass Communications

The Multi-media production unit in the Institute is equipped to produce teaching aids, pamphlets, audio tapes, leaflets and video programmes.

There is a radio production studio and control room.

Television production facilities include an 1,800 sq. ft. studio and control room. A film room houses two sound-editing tables and provides a work area for film viewing and winding, splicing and editing. The equipment includes colour cameras, video-recorder and monitors, and editing machines. Unfortunately the system operates on the PAL standard and Jamaica is now changing to NTSC.

The graphics room is well equipped and prepares material for print and film/television production. The Unit has fully equipped dark room facilities and six colour enlargers, and also houses a still

photography complex.

These facilities are adequate for production of films, video tapes, still photography, and radio and television programmes. The unit also has some facilities for maintenance and repair of its equipment.

St. Augustine

Multi-Media Production Centre, School of Education

The School of Education at the St. Augustine campus has a television studio staffed by an educational techonologist and an electronic technician who handle simple productions. The hardware includes a video console with five monitors and a special effects generator, and a telecine with facilities for converting 15 mm film, 8 mm film and 15 mm slide inserts to video.

The television studio is also used for recordings for radio.

There are graphics production facilities staffed by one composer operator and two graphic artists.

D. ELECTRONICS UNITS

Mona

The Electronics Unit at Mona is a central service facility. Its laboratories include:

- Standards/Calibration room equipped for maintaining instruments to specifications;
- storerooms;
- a Printed Circuit Laboratory for fabricating printed current boards and for conventional photographic work;
- a Special Projects Laboratory containing an advanced multi-user micro computer system and radio communications equipment;
- a fully equipped metal workshop with precision lathe and mill.

The Unit presently employs eight technical staff.

Support for a Communications System

The Electronics Unit has already had working experience with satellite communications systems using both audio and video. The necessary equipment for the installation and commissioning is

available.

The Unit can also support operations, maintenance and servicing. Three staff members are licensed in Jamaica as Radio Technicians and therefore the Unit is legally entitled to install and maintain transmitting equipment.

The Unit claims the competence to handle even major breakdowns. Obviously, however, due to the specialized nature of many components required for communications work, suitable spare components and sub-modules would need to be held in store.

The data-analysis capability provided by the micro-computer system, could support remote data links.

Cave Hill

The electonics unit at Cave Hill is small but is reasonably well equipped and is being steadily improved. Cave Hill has already had a good deal of communications experience and can deal with installation and routine maintenance.

St. Augustine

The electronics unit in St. Augustine primarily serves the needs of the Faculty of Engineering. This unit has not yet had the experience of the Mona and Cave Hill units in communications work but there is no doubt of its capability to carry out the usual installation and maintenance work.

The Seismic Unit at St. Augustine on the other hand has had a great deal of experience and are capable not only of helping to support routine work but have a powerful record of excellent system design work. Particularly for data and information transfer systems their assistance would be invaluable.

E. UNIVERSITY AND EXTRA-MURAL CENTRES

University Centres

At present there are University Centres in eight of the non-campus territories. In the Bahamas the facilities of the College of the Bahamas are being used; in the British Virgin Islands some facilities are arranged as needed. The Cayman Islands have no programme.

The University Centres are the places from which Extra-Mural activities are directed and at which many of the activities take place and would doubtless be the focal points for any extension services.

A typical Centre consists of an office, a library and one or two lecture rooms for lectures, seminars and workshops. Many Centres also use other public buildings for classes. Equipment at Centres is very

limited. All have duplicating machines, one has overhead projectors, movie projectors and slide carousels.

Staff and Students

A University Centre is usually staffed by a resident tutor, a secretary and sometimes a library assistant who is in charge of a small library containing a few thousand volumes. At present eight non-campus territories have full-time resident tutors, the Bahamas have a full-time UWI representative, while the British Virgin Islands, Carriacou and Nevis have part-time representatives; the Cayman Islands has no tutor.

The University Centres serve from about 100 to 500 part-time students yearly, depending on the territory. A wide variety of seminars, workshops, lectures and other activities are sponsored. These vary from courses for upgrading formal qualifications to numerous activities in the creative arts.

Extra-Mural Centres

The Extra-Mural Centre in Barbados has two class-rooms and is situated near Bridgetown. Jamaica has two Centres: in Kingston the Centre at Camp Road has three classrooms and three offices while in Montego Bay there is only one office and classes meet at Montego Bay High School. Trinidad and Tobago have no Centre with classrooms, but there is a main office at St. Augustine campus and branch offices in Port-of-Spain, San Fernando and Scarborough, Tobago. Students meet at UWI and in Secondary schools all over the country.

Staff and Students

Barbados and Trinidad have one resident tutor each and Jamaica has two resident tutors, one at each Centre. Barbados serves about 350 students in a year; in Jamaica the Montego Bay Centre serves about 150 yearly and the Kingston Centre, over 2,500; in Trinidad 9,000 - 10,000 students were served by the Extra-Mural offices in recent years.

There are only 16 members of Extra-Mural academic staff throughout the Region, and the majority of the budget provides for the direct costs of staff, leaving very little for programmes and staff travel.

Facilities for New Programmes

The Extra-Mural Centres and University Centres could obviously play a large part in any distance education programme. The present facilities and staff could provide the core for such programmes but some upgrading, depending on the scale of any proposed programme, would be necessary.

Most Centres have time and space available for new day time programmes, but present facilities are generally fully booked in the

evenings. A few Centres have office space for an extra tutor and others have room for expansion. Most Centres have a library housing a few thousand volumes and some specialize in particular areas. Several Centres have study space for 20 or more students. In some territories it may be difficult to obtain new telephone lines for the Centre. In most of the territories part-time technical assistance would be available to maintain and repair communications equipment.

CHAPTER TEN

POSSIBLE TELECOMMUNICATIONS NETWORKS

Although the model being developed for distance teaching depends on an interactive network, it seems worthwhile to describe briefly some of the existing broadcast systems.

Radio

Radio is the most widely used mass medium in the Commonwealth Caribbean. Each territory has one or more radio stations transmitting at least twelve hours daily and most households are reached by radio.

Local radio stations cover most or all of each territory. In addition, some territories also have good reception from other territories:

1. Radio Trinidad reaches most of the Windwards and Leewards;

2. Radio Barbados reaches 80 percent of the Windward Island territories;

3. Radio Caribbean International in St. Lucia, reaches all Windward and Leeward Islands;

4. Radio Antilles in Montserrat has a reach of 800,000 square miles and easily covers the Leewards and much of the Windwards.

5. Jamaican broadcasts can be heard on occasion in the Eastern Caribbean but apparently only at nights and when conditions are ideal.

There are quite extensive networks for VHF radio utlizing repeater towers at least in the larger territories. Some of these are used for broadcast, others for interactive communications needs and these facilities could be useful for any intra-territorial activity.

Television

Barbados, Jamaica and Trinidad and Tobago have substantial television broadcast facilities.

Local television stations in the Leewards, Bahamas and Barbados have the potential of reaching about 100 percent of the population. However, only in the Bahamas and Barbados do over 75 percent of households have television sets. In Antigua and St. Kitts over 40 percent of the households have television sets. In the Windwards, the television set density is less than 5 percent.

Some territories have good television reception from other territories:

1. Grenada and a small portion of St. Vincent receive television from Trinidad and Tobago, but these islands have few receiving sets;

2. Barbadian television reaches parts of St. Lucia and in Dominica, but these islands also have few receiving sets. The relay station in Dominica was destroyed by Hurricane David in 1979 and has not yet been replaced;

3. None of the Leeward Islands receives signals from Trinidad and Tobago or Barbados. Television stations in Antigua and St. Kitts can both reach throughout most of the Leewards, but the potential coverage is limited by the number of television sets in most islands.

Standards

The territories do not all operate with the same television standards; some use the 525 lines, 60 Hz, American standard NTSC and others the 525/50 Hz NTSC.

BROADCAST VS CASSETTES

Broadcast systems are playing a part in the education systems within individual countries, e.g. the Open University in England, and this role is expected to increase with time. These systems may be used to supplement UWI distance teaching programmes but they are neither distance independent nor interactive.

Since the University programmes are directed to a relatively small number of persons, and since the emphasis will be on centre to centre programmes rather than home reception, video and audio-cassettes would be more effective, cheaper, and more flexible than broadcasts.

INTERACTIVE NETWORKS

An ideal communications network would consist of the required number of small earth stations interconnected by satellite audio channels and a number of peripherals with video and/or graphics capability. Such a system could be configured to deal with all the University's project telecommunications applications. It could have all the advantages of flexibility and would overcome any problems with local loops. This type of ground station does seem to be the way in which multipoint communications will have to develop particularly as the costs have declined and are expected to decline even more. Remarkably, earth station capability* which cost 2 million US dollars in 1965 and US$30,000 in 1981 may reach as low as US$5,000 by 1986.

Towards the end of this decade there will probably be an enormous

*Telecommunications 16, No.3, p.21. (1982).

expansion in the use of satellite communications via small Earth stations and even now in Indonesia, the Phillipines and India, as examples of activities in less wealthy countries, there is a powerful move in this direction. But the situation in the Caribbean is complex at this time. Much of the difficulty is caused by policy. For one thing, the Caribbean, though a cohesive region, comprises independent nations so that international regulations are applicable. Despite this, the possible use of one of the domestic satellites whose foot-print covers some or all of the Region has many attractive possibilities and should be kept in mind although voice broadcasts using domestic US satellites would not be allowed.

The only two sources of immediately available satellite capacity seem to be ATS-3 and INTELSAT.

ATS-3

The use of ATS-3 in a manner similar to the use of ATS-1 by PEACESAT and USP would have all the advantages referred to previously. The ground stations can be small and relatively cheap** the performance is expected to be good; the cost is completely distance independent; and the stations can be increased (or decreased) in number with no effect on the remainder of the network. The quality and performance of ATS-3 systems including various peripherals can be very high indeed as exemplified by the operations of the University of Miami.

Provided that sufficient time is available for UWI use, ATS-3 would provide an ideal solution in the near term. At least several hours would be available weekly, but NASA has announced that operational financing for ATS-3 is only assured through September, 1984. There must therefore be some concern as to whether, desirable as it would otherwise be, a long term project focussed on ATS-3 could be mounted. A fairly short term or a portion of a longer term project, might however be appropriate.

A network consisting of small earth stations for ATS-3 only might be rather similar to the USP ATS-1 network. The stations may be allocated as follows:

Barbados	- 1 - Cave Hill
Trinidad & Tobago	- 2 - St. Augustine and San Fernando
Jamaica	- 3 - Mona, Montego Bay and Mandeville

Other territories could be selected according to the programmes mounted. These territories would get one station each. This network would be technically versatile, but there might be constraints on time

**Although figures as high as US$20,000 have been quoted for high quality equipment in small quantities.

tabling since the availab. hours would need to be determined by NASA. For "simple" sites also there might be the problem of the confidentiality of teleconferences.

INTELSAT

INTELSAT certainly has the satellite capacity. A single transponder on an INTELSAT satellite has a band width of 36 MHZ which is equivalent to roughly 1,000 telephone channels in simultaneous use. Full motion video requires a band width of 17.6 MHz - about half a transponder, the rental of which would be about 400,000 US dollars per year. One half transponder is the minimum number of channels that INTELSAT is likely to rent to a user. This is a great deal of capacity, but the cost of the cheapest INTELSAT earth station is still of the order of US$200,000. This alone would represent a capital investment of well over US$2,000,000, if each territory received a single site. In the future, all these costs are likely to fall and INTELSAT is discussing special tariff rates for the South Pacific region. These rates may make the INTELSAT satellites attractive for education and public service. For the time being, however, the option of small independent earth stations with INTELSAT satellites is not available.

Leased or toll call circuits using the international carriers in the Caribbean are technically feasible. Full motion video is not now cost effective. An interactive audio channel capable of supporting peripherals such as slow-scan television, facsimile, telewriters, micro-computers, etc. would be much more appropriate commercially. The commercial carriers affirm that they can provide all the services necessary for a distance teaching network.

CARIBBEAN COMMUNICATIONS

INTERNATIONAL TELECOMMUNICATIONS

External telecommunications for the territories served by the University of the West Indies are provided by Jamaica International Telecommunications Limited (JAMINTEL), Trinidad and Tobago External Telecommunications Company Limited (TEXTEL), the Bahamas Telecommunications Corporation, and Cable and Wireless (West Indies) Limited (C&W), which serves the rest of the territories from headquarters in Barbados.

There is a standard "A" satellite ground station in each of Barbados, Guyana, Jamaica, and Trinidad. Belize and the Cayman Islands each have a standard "B" ground station. The standard "B" stations are smaller, using an 11 metre dish rather than a 29 metre dish, need fewer staff, can be made operational in about one-third of the time, and are cheaper than the standard "A", but "A" and "B" stations cannot inter-communicate directly. The ground stations have full communications carrier capability.

These stations are linked to INTELSAT satellites. The owners of the stations are members of specialist committees of the International Telecommunications Unions (ITU). The external carriers maintain links with each other through the West Indies Consultative Committee on Telecommunications (WICON).

The island chain from Trinidad and Tobago in the South, through the Windwards and Leewards to Tortola, B.V.I. in the North, is linked by the 800 mile long Eastern Caribbean microwave system. This system can carry 960 high grade voice channels or many thousands of telegraph, telex and data channels. It has the capability for reception and transmission of international television. Transmission is achieved by line-of-sight microwave involving hops of up to 100 miles, except for the Barbados St. Lucia spur which, because of the distance, uses a tropospheric scatter link. A 60 channel microwave link for Guadeloupe, Montserrat, St. Kitts and Saba is planned as also is a 60 channel 900 MHz link between Barbados and St. Vincent.

C&W, JAMINTEL and TEXTEL provide the following external telecommunications services:

- international telephone service;
- international television transmission and reception in colour or black and white;
- international telegraph service;
- international telex service;
- facsimile services;

- programme transmissions (HF voice casts);
- maritime telephone and telegraph services.

The international communications system appears to be quite adequate for distance teaching, etc., there is, however, some concern about the quality of the local loops.

Costs of International Telephone Services

Typical costs for the various international leased links are shown in Table 51. These are the approximate costs obtaining in 1982.

Table 51: Approximate Monthly charges for 24 hour leased lines.

Link		Monthly Costs (US$)
Antigua	- B.V.I.	2,265
Antigua	- Dominica	1,500
Antigua	- Montserrat	750
Antigua	- St. Kitts	750
Antigua	- St. Lucia	2,250
Barbados	- Jamaica	3,105
Barbados	- St. Lucia	1,600
Barbados	- Trinidad	1,890
Jamaica	- Bahamas	6,125
Jamaica	- Belize	3,035
Jamaica	- Cayman Islands	1,255
Jamaica	- Trinidad	2,210
St. Kitts	- B.V.I.	1,605
St. Kitts	- Montserrat	685
St. Lucia	- Dominica	1,365
St. Lucia	- Grenada	1,430
St. Lucia	- St. Vincent	685
St. Vincent	- Grenada	715
Trinidad	- Grenada	1,055
Trinidad	- Guyana	1,125

INTERNAL TELEPHONE SERVICES

Cable and Wireless (W.I.) Limited operates internal telephone services in Antigua, British Virgin Islands, Cayman Islands, Dominica, Grenada, St. Lucia, Montserrat, St. Kitts/Nevis and St. Vincent. In the rest of the territories, telephone services are either nationally owned, or as in the case of the Bahamas and Barbados, are owned by Continental Telephone Corporation of the U.S.A.

Telephone communications are reported to be reasonably good in: Antigua, Barbados, Grenada, Jamaica, Montserrat and St. Vincent. It

would seem risky however to depend on a dial up service and the University site should therefore be connected by a 4-wire line to the international gateway. This line should probably be conditioned to a baud rate of 2500 and would be leased on 24 hour basis. This should give high quality communications free of echo and noise. Some costs are shown in Table 52.

Table 52: Approximate Costs in US$ of Leased 4-wire Lines from Teaching Site to International Gateway.

Origin	Monthly Lease (US$)	Installation (US$)
Cave Hill	60	200
Mona	270	185
St. Augustine	85	200
Dominica (Extra-Mural Centre)	20	50
St. Lucia (Extra-Mural Centre)	10	95

The lease rate from Mona to Montego Bay is remarkably high - US$4,490 per month. This rate would effectively rule out the use of Jamaica Telephone Company leased lines for distance teaching within Jamaica.

INTER-TERRITORIAL NETWORKS

1) All UWI supporting territories

While it is desirable, to link all the territories, the incremental cost of including certain territories may be considered high when the likely extent of usage is considered. For example, the British Virgin Islands and the Cayman Islands together have only 0.5 percent of the population of the territories (24,000). During the academic year 1980/81 there were about 10 students from B.V.I. and 2 from the Cayman Islands registered in UWI. Although distance teaching may help increase the numbers it does not seem cost effective to include these territories in a pilot. Neverthelss, it seems worthwhile as a starting point, to estimate the approximate costs of a full system such as shown in Figure 8.

Jamaica could be linked to the Eastern Caribbean by satellite either at Trinidad or Barbados. Trinidad is chosen because it is cheaper and is directly on the microwave chain which serves all the other Eastern Caribbean territories except Barbados. Jamaica could be linked to the Cayman Islands by undersea cable and to Belize and Bahamas via U.S.A.

Belize and Bahamas are two satellite hops away from the Eastern Caribbean. This has disadvantages but a link-up - Pacific Islands - ATS-1 - Denver - ATS- 3- Caribbean during PROJECT SATELLITE worked excellently.

The cost of leasing this network is approximately US$271,000 per annum without bridging devices. This could be reduced somewhat either by eliminating sites and/or by using an alternative delivery system at some points of the network. It would seem reasonable as mentioned above to eliminate B.V.I. and the Cayman Islands initially, but the Bahamas and Belize require further consideration.

Bahamas

The Bahamas with the UWI school of Hotel Management, the College of the Bahamas and its very strong interest in developing education would seem a logical site for a programme. Every outreach programme so far envisaged would be of inteerest. Bahamas is also a member of the Joint Board of Teacher Education. Yet this link to Jamaica is the most expensive single link amounting to about US$73,500 per annum.

Belize

The total number of students from Belize presently (1981/82) registered in UWI only 46 and Belize has not yet fully entered the Challenge Scheme. Nevertheless Belize is well worth considering as a site particularly if there is an agriculture component, which the UWI Faculty of Agriculture considers essential, and Belize is also a member of the Joint Board of Teacher Education. The link Jamaica-Belize on a 24 hour lease would be as high as US$36,500 per annum.

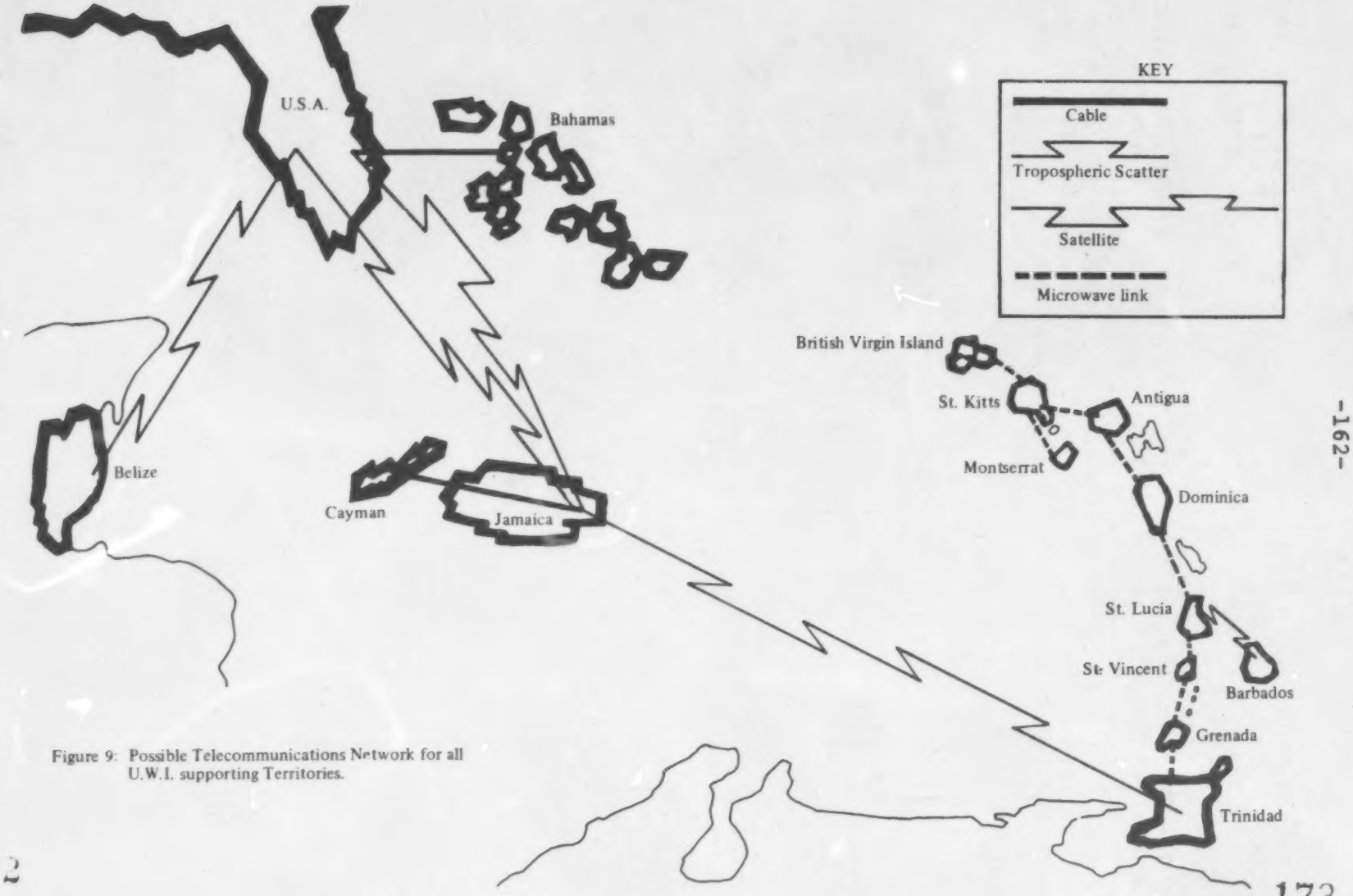

Figure 9: Possible Telecommunications Network for all U.W.I. supporting Territories.

The Western Caribbean

The links to Bahamas and Belize total some US$110,000 per year in lease costs alone. Ths seems inordinately high and indicates the use of an alternative delivery system for these services.

The Eastern Caribbean

It would seem reasonable initially to exclude both Montserrat and B.V.I. If this were done, the cost of the Eastern Caribbean section of the network (including Jamaica) in Figure 9 would be about US$119,000 per year.

Another possible network suggested by C&W is shown in Figure 10. Excluding B.V.I. and Montserrat also from this would give an annual cost of US$160,000. All these figures are exclusive of leases of bridges, switches, etc.

RECOMMENDED NETWORK

It would be a mistake to put in place too large a system initially even if sufficient funds were available. A distance education programme should be mounted with minimum pertubation of the University's on-going programmes, and phased so that it gradually becomes an integral part of the University's programmes. Academic staff, administrators and technicians have to be trained and to gain experience with the system, and they, the students and the community, will need proof that the system works. Therefore a pilot is necessary.

The recommended network is shown in Figure 11. This network links the three campus territories with Belize and the Bahamas in the West, and in the East with two countries in the Windwards and two in the Leewards. Belize and the Bahamas are connected through Jamaica using an ATS-3 subnet which could be interfaced with the telephone network as required.

It seems absolutely necessary, to ensure developments during and beyond the pilot, that as wide a cross section of administrative and academic staff should have the opportunity to use and become familiar with teleconferencing. This would require the exclusion of various sites as needed to ensure confidentiality and therefore, switching capability not only on the ATS-3 network which is simple, but also in the Eastern Caribbean.

This network is indicative only. The details would, of course, have to be settled with the carriers. The approximate cost for leases would be US$162,000 annually. Bridges and at least one switch would be needed. An excellent switch would cost about $32,000; the bridges are quite cheap.

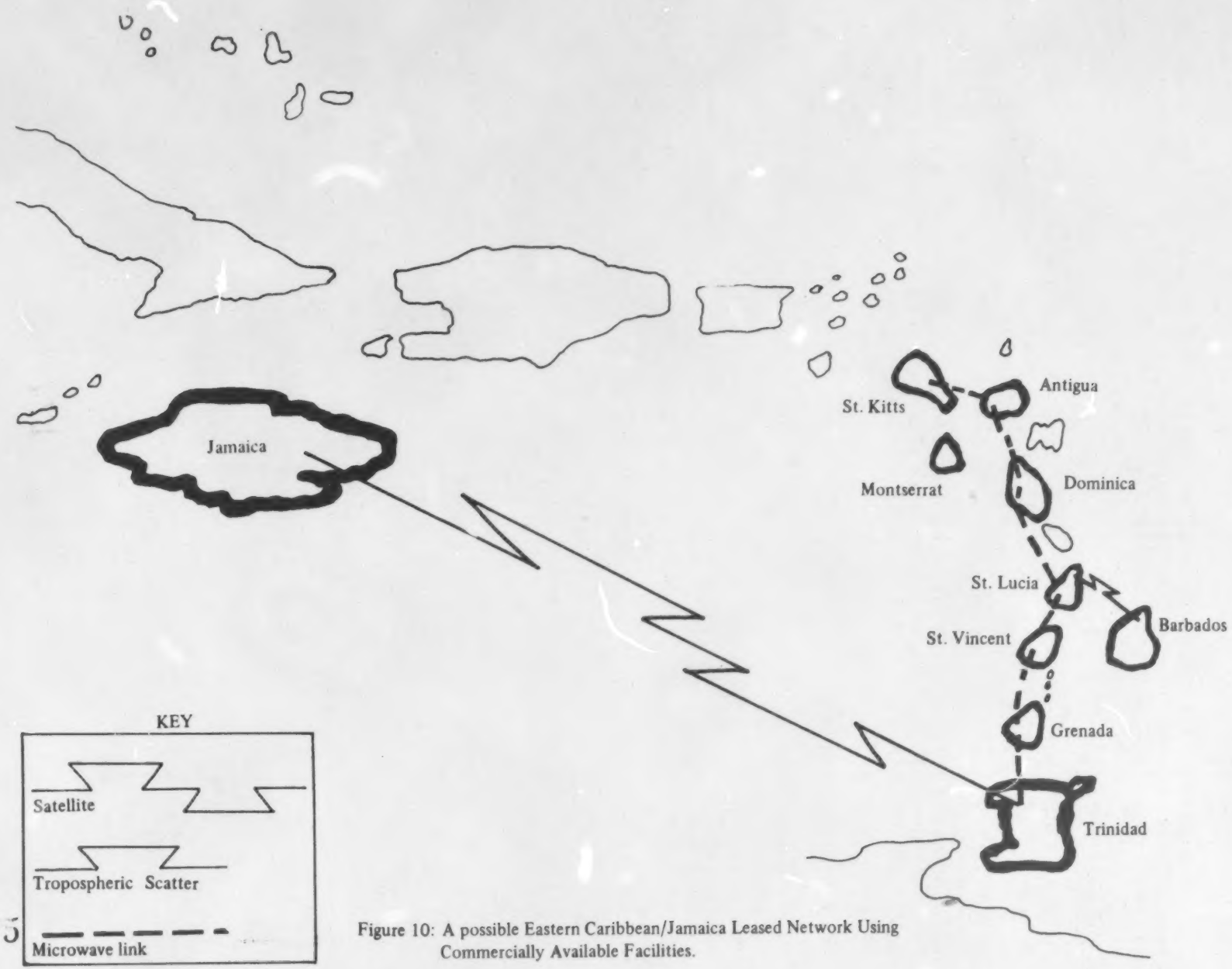

Figure 10: A possible Eastern Caribbean/Jamaica Leased Network Using Commercially Available Facilities.

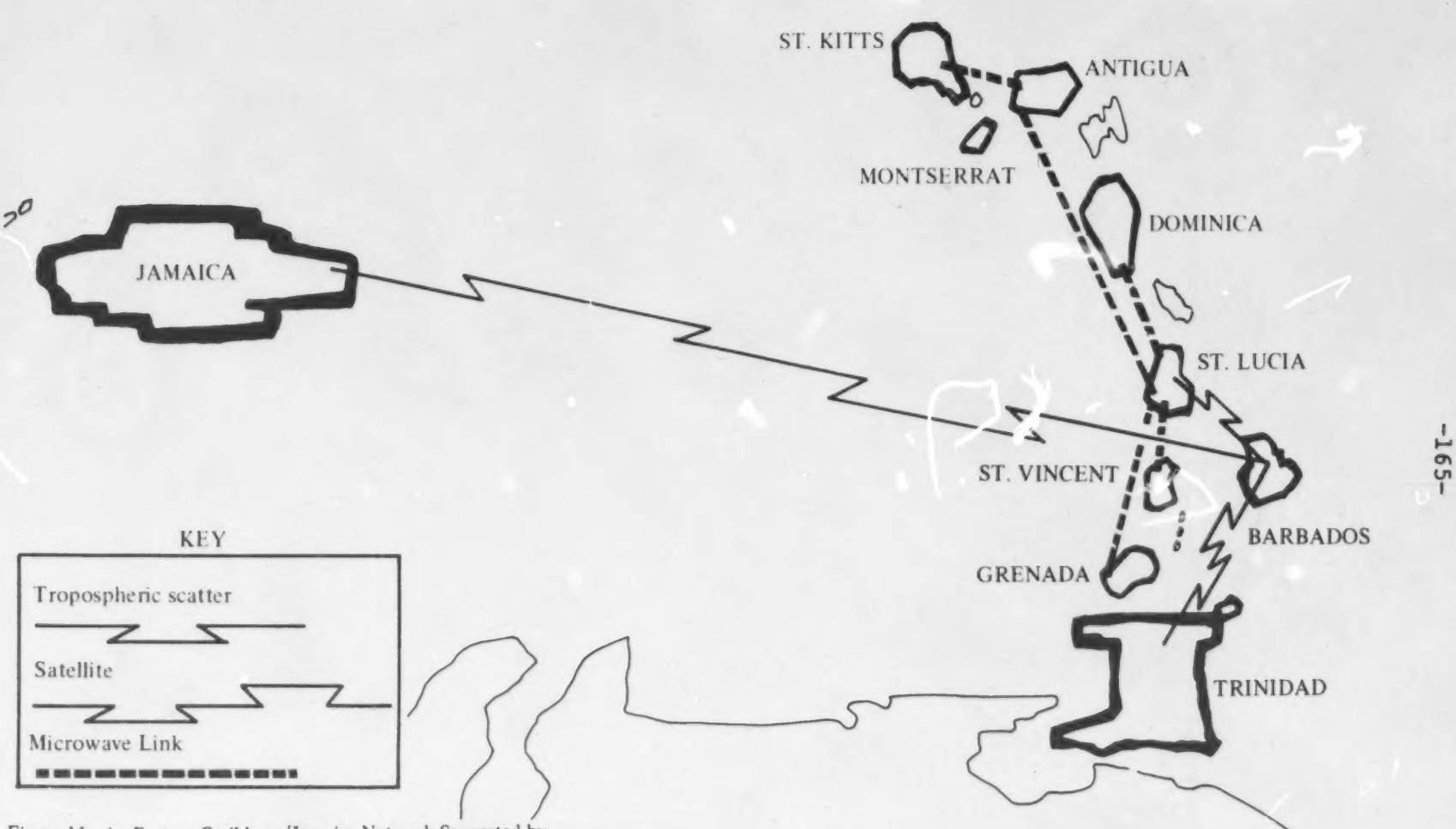

Figure 11: An Eastern Caribbean/Jamaica Network Suggested by Cable and Wireless (West Indies); Ltd.

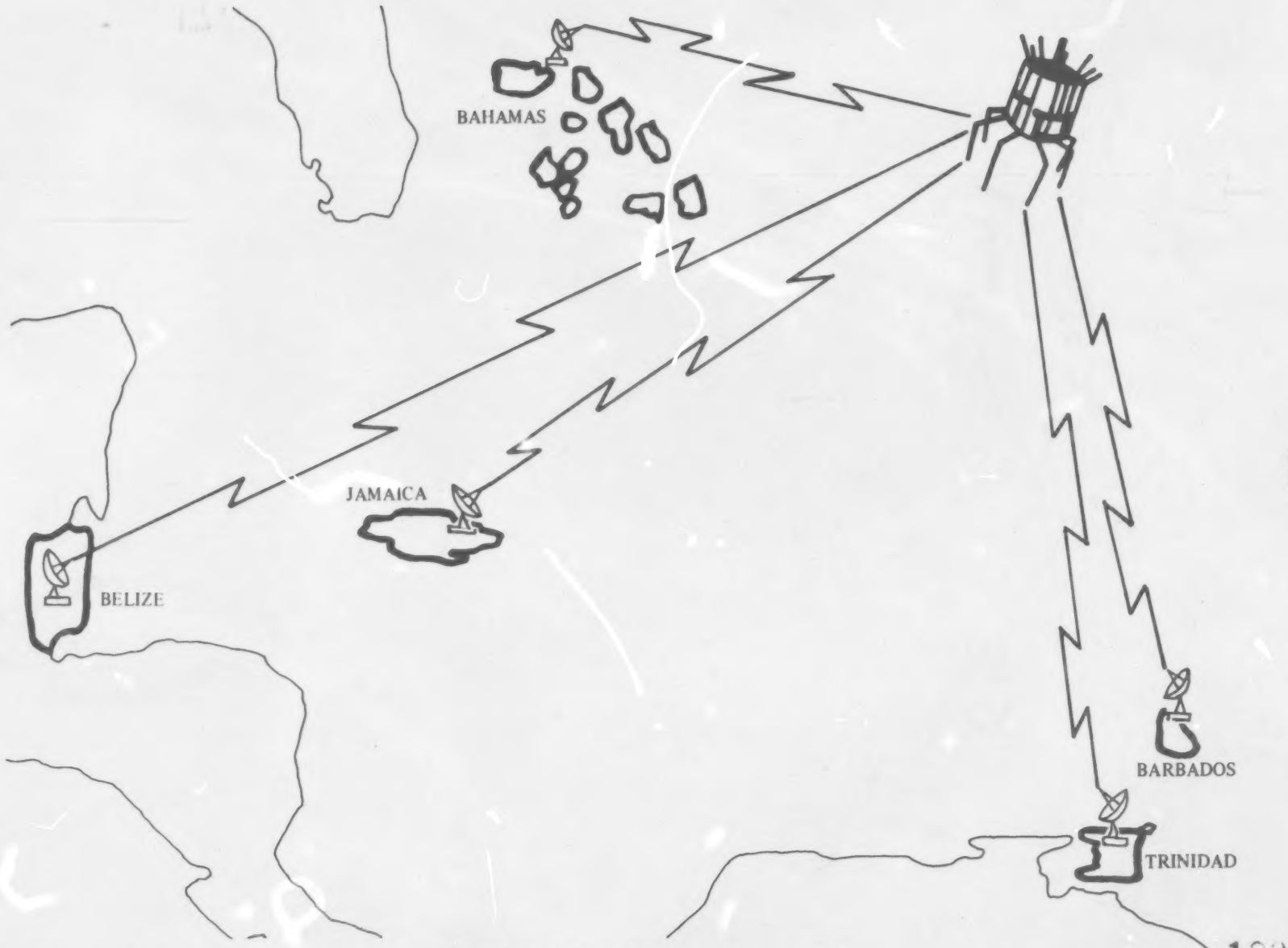

Figure 12: Network linking Campus Territories with Belize and Bahamas using ATS–3.

INTRA-JAMAICA

The telephone demonstration described in Chapter Eight indicates that severe problems due to noise might be expected using standard conference call link-ups. Leased lines, conditioned as necessary, and high quality bridges would be possible, but the cost of leases within Jamaica is very high indeed. A FM radio network seems much more promising.

This is made even more attractive by the fact that both local stations, Radio Jamaica Ltd., and Jamaica Broadcasting Corporation, are willing to provide not only engineering assistance, but also to share some of their infra-structure. This would obviate the need for the purchase of towers, emergency electricity supplies and training for maintenance workers. But, of course, the project would have to provide its specialised equipment such as transceivers and repeaters and peripherals.

Moreover, in FM broadcasting it is technically possible to broadcast up to three separate programmes (the main channel and two sub-channels) simultaneously. This allows simultaneous transmission of audio and slow-scan television which could lead to a powerful learning system.

Recommended Network

Figure 12 shows the location of the teachers' colleges in Jamaica and an outline of the recommended network of five sites. In view of the concentration of colleges in the Kingston area, a second site would be useful there. The recommended locations are therefore:

Kingston : Area UWI (Mona) and Mico Teachers' College

Central & Southwest : Mandeville, Church Teachers College

North Central : Moneaque Teachers College

Northwest: Sam Sharpe Teachers College

Northeast : Port Antonio - Passley Gardens

An additional site at the Extra-Mural Centre in Montego Bay would be advantageous; this could be added at any time. Teleconferencing sites

Each site would require antenna, transceiver, mixer and microphones to provide for full audio teleconferencing and allow for desired peripherals.

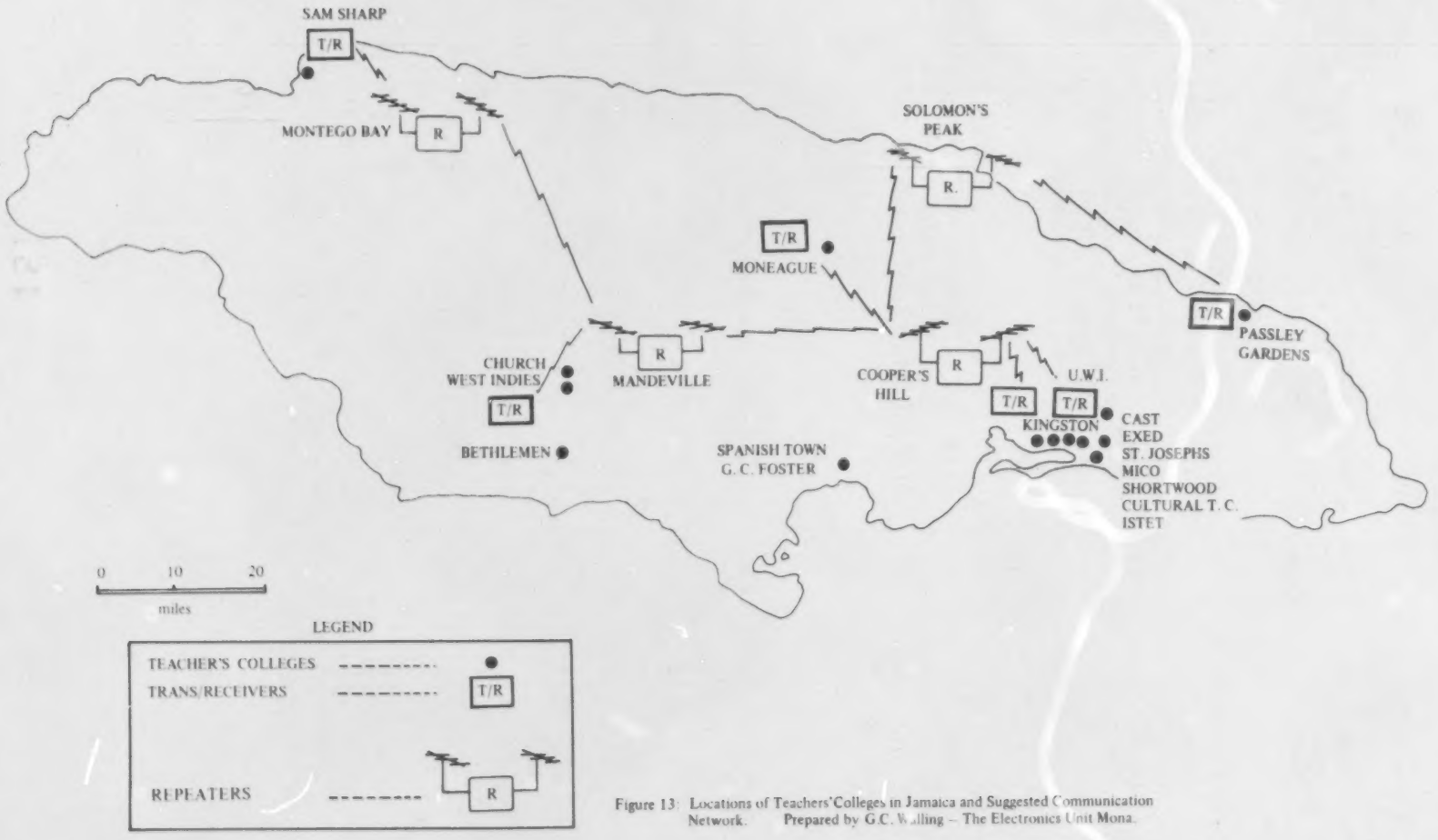

Figure 13: Locations of Teachers'Colleges in Jamaica and Suggested Communication Network. Prepared by G.C. Walling – The Electronics Unit Mona.

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Figure 13 shows the basic overall schematic for a system which would use standard components throughout; and would require frequencies assignment from the Post Office. There is no doubt that these would be readily given. Figures 14 and 15 show the basic requirements of the repeater stations. The Cooper's Hill station would be slightly more sophisticated than the others since it interconnects with several repeaters. Figure 16 gives a block diagram of the arrangement of the electronic components in a typical teleconferencing site.

The peripherals might include facsimile, electrowriter and slow-scan television. Micro-computer terminals might be useful additions.

Table 53: Indicative Costings for broadcast equipment for a typical site.

Equipment	Item Cost US$
Microphones with Speech Conditioner	2,500
Audio Mixer. McMartin BR-400. 4-channels VU meter. Controls, Cannon and Terminal Connections. Phono Facility, 600 Line. PA for local monitor	600
UHF Transceiver for Base Stations. RCA TAC 500 30 Watts. 406-420 MHz (Option 450-482 MHz) complete with accessories. Dyplexers. Anteennas and Mast.	6,000
Audio Matching Unit with Data Modem	500

Indicative costings for a repeater site are in Table 54.

Table 54: Indicative Costings for a Repeater Site.

Repeater Station operating frequency (UHF) 406-420 MHz (option 450-512 MHz) Basic unit RF Power 65 watts. Dyplexer, Antennas, Filters and Isolators.	8,000
Low Loss UHF Coaxial Cable. 400 MHz. Att. better than 1db/100 ft.	800
Spares for emergency and backup maintenance	1,000
Total	9,800

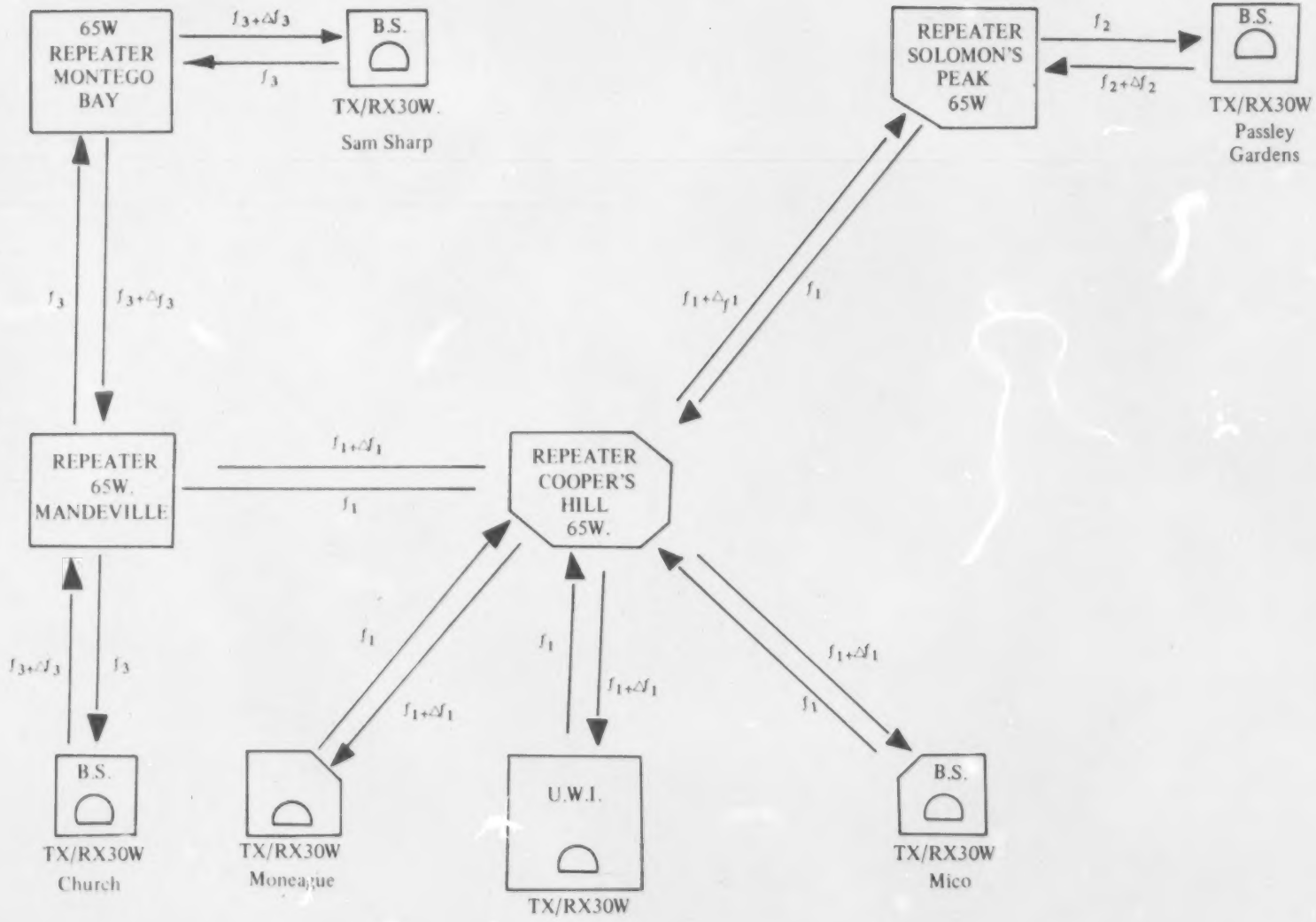

Figure 14: Basic Schematic of Intra-Jamaican Network with three REPEATERS and Six Sites.

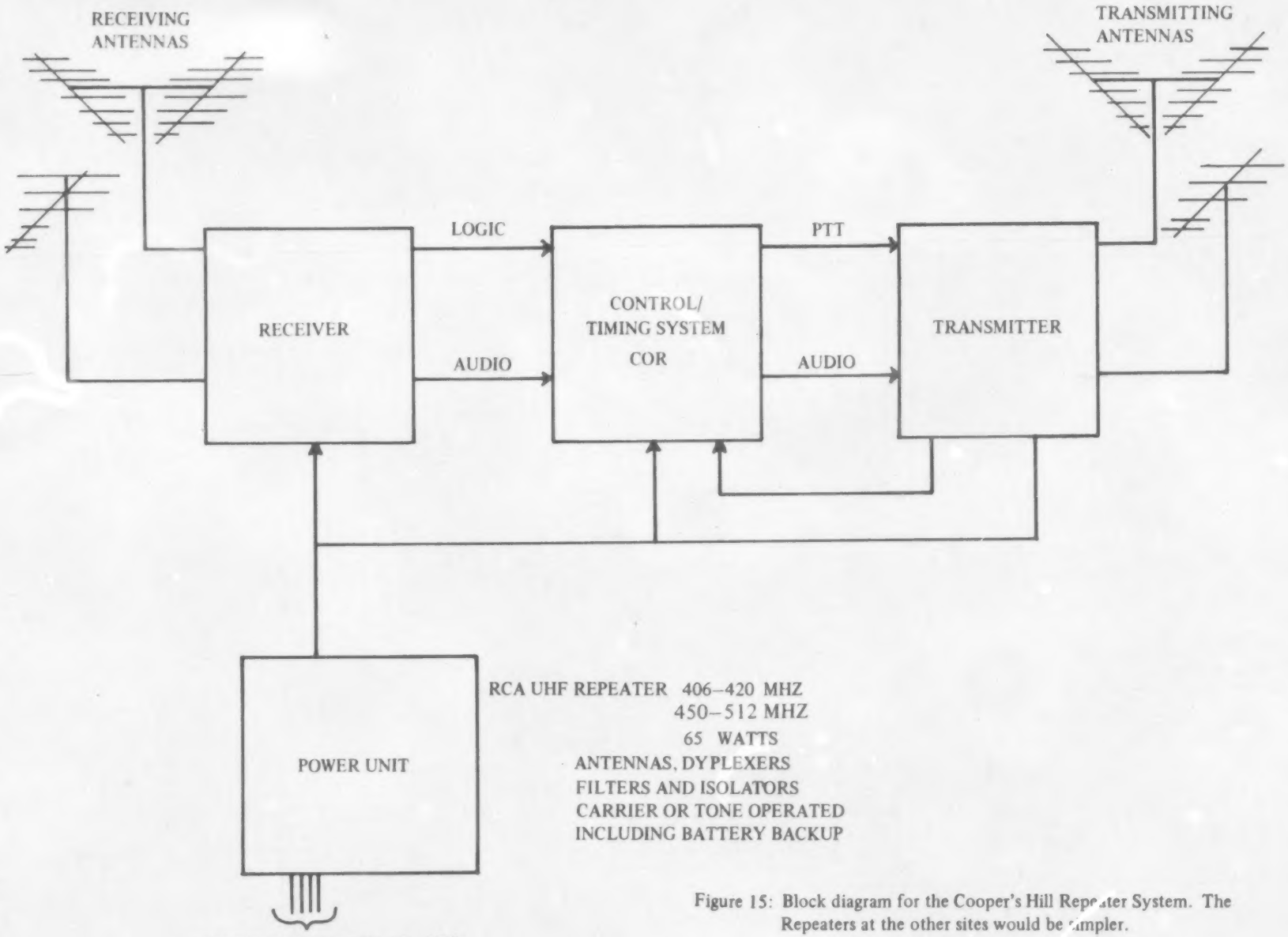

Figure 15: Block diagram for the Cooper's Hill Repeater System. The Repeaters at the other sites would be simpler.

Prepared by G.C. Walling – The Electronics Unit Mona.

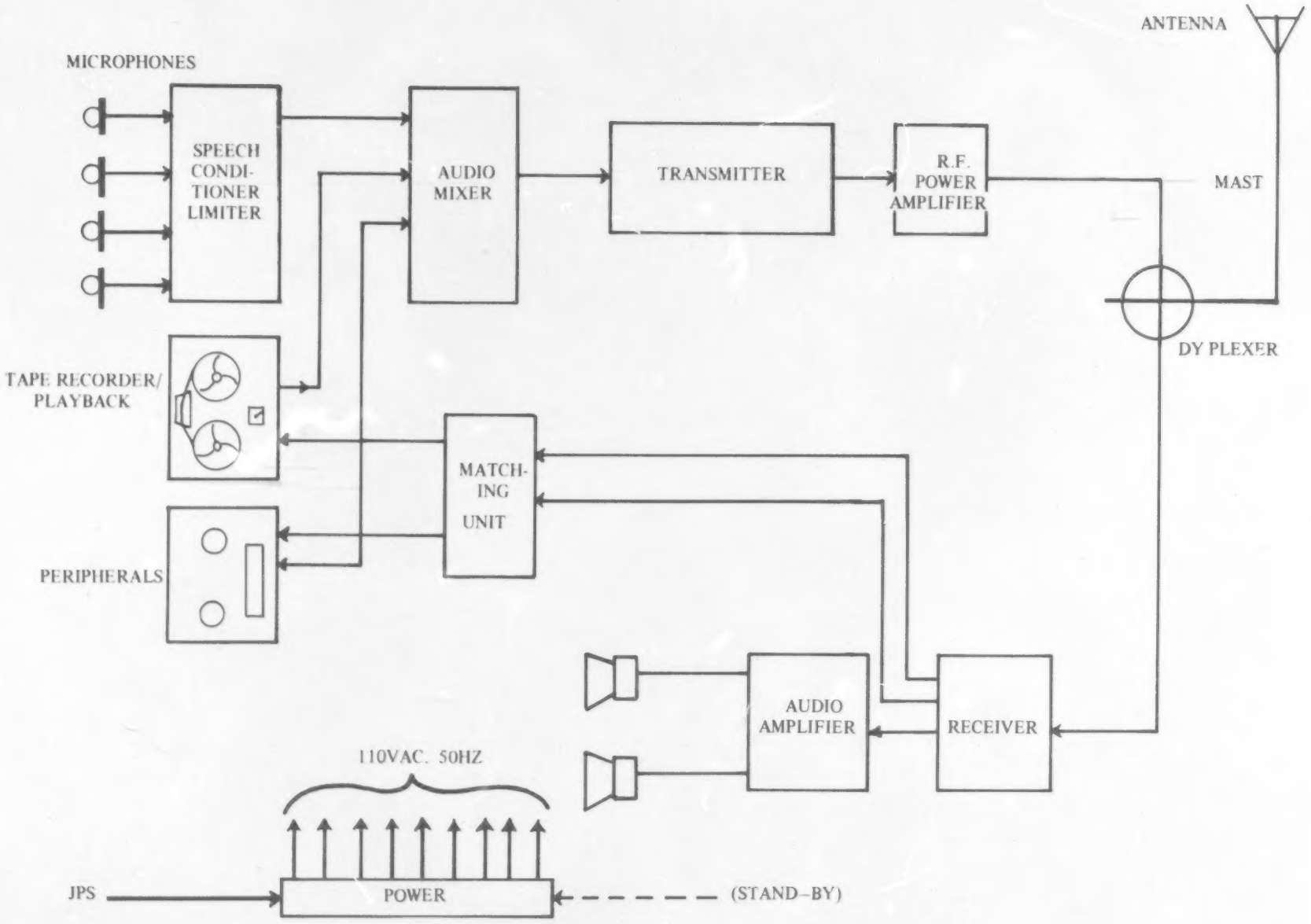

Figure 16: Block Diagram for a Teleconferencing Teaching Site. Prepared by G.C. Walling, The Electronics Unit – Mona.

CHAPTER ELEVEN

CONCLUSIONS AND RECOMMENDATIONS

The decade of the seventies was difficult and the outlook for the eighties does not inspire much higher level of optimism. "The Global 2000 Report to the President" emphasises: "For hundreds of millions of the desperately poor, the outlook for food and other necessities of life will be no better. For many it will be worse. Barring revolutionary advances in technology, life for most people on earth will be more precarious in 2000 than it is now - unless the nations of the world act decisively to alter current trends".

Communications and computer technologies are such advances. Put to work in a deliberate and appropriate manner, they have the potential to eliminate many present bottlenecks and to open new avenues of development at affordable costs.

This report has treated a variety of relevant applications of telecommunications some in industrialised countries, but many in developing countries and several in the Caribbean itself. These examples illustrate the power of the techniques.

There is no question about the needs. These indeed are of such a magnitude that it is difficult to see how they might be met using only conventional methods. At the same time, the smaller territories in the Eastern Caribbean (and to some extent Belize) are in a very special situation.

In certain instances, despite the overall scale, many small units are involved and aggregation seems the only economical way to deal with these. There is also the problem of the financial viability of certain programmes. These territories would be very hard put to fund unaided the total cost, even the recurrent costs only, of any programmes on a scale which is large enough to have a real impact. Hence Regional programmes with the larger territories participating appear particularly attractive.

The recommendations which follow are not, intended to be exhaustive but to aid in fixing a network and programme which could be put in place early.

Although a main thrust of the proposed activity is directed at assisting the non-campus countries it is vital that the needs of the campus territories also be dealt with. These territories and the Bahamas have over 85 percent of the population of the English speaking Caribbean and their financial participation must lead to greater regional interest and lower unit costs.

Two programmes are recommended; one would be mainly Jamaican, the other a University programme extending across the Caribbean. Proposals for the former are being developed now for discussions with the Government of Jamaica the latter has already been accepted in

principle by the Governments and the University Council and indeed partial funding has already been secured for an early start albeit at a much lower level than is desirable.

RECOMMENDED PROGRAMMES

JAMAICA

The recommendation is that the Ministry of Education, Jamaica, and the Teacher Training Section of the UWI school of Education should seek to develop a FM radio-based network, based as far as is possible on the infrastructure of the two existing broadcast stations, with at least three but preferably six sites.

During the first year of operation, the main thrust should be in teleconferencing to improve curricula, to deal with examination related matters and to carry out specialist teaching activities. This would serve to train teachers and accustom users to the system, which thereafter should increasingly be utilised for other teaching programmes.

This system could be independent of any UWI Caribbean Distance Teaching Project, but useful savings would be achieved by some integration of both programmes. The local network could help distribute the services earlier proposed for the Caribbean, throughout Jamaica. A likely system has been describe and some costs given in Chapter Nine. Since a proposal is being sent to the Government of Jamaica it is inappropriate to discuss this system further.

CARIBBEAN

UWI should urgently attempt to institute a pilot project of appropriate scale and duration to supply education and public services by teleconferencing in the following territories: Antigua and St. Kitts in the Leeward Islands, Dominica and St. Lucia in the Windward Islands, Belize and the Bahamas in the Northwest and the three Campus territories, Barbados, Jamaica and Trinidad. It is essential that the programme include academic, administrative, and research teleconferencing between the campus countries; and while it must focus on University training, a substantial outreach component should be included early.

INTERIM OBJECTIVES

1. To demonstrate the use of teleconferencing in education and public service throughout the Region and to familiarise the University and the communities with the power and tools of the techniques;

2. To measure the actual level of demand for services so that an operational system can be designed;

3. To establish a core of experience and of experienced workers in a number of areas, e.g. distance education methodology and techniques; preparation of educational print and audio-visual materials; maintenance of communications equipment and peripherals;

4. To investigate the probable effect of distance teaching and other services on the normal activities of UWI;

5. To examine the feasibility of establishing local systems, e.g. in Jamaica, Trinidad and Tobago, and Belize, to deal with both UWI and non-UWI requirements;

6. To examine the extent to which other Regional organisations, e.g. Caribbean Examinations Council, might benefit from sharing a permanent network;

7. To examine the financial viability of a permanent service, including sources and projected amounts of revenue.

DISTRIBUTION SYSTEM

The system shown in Figure 16 provides a starting point for discussion. It should distribute services among campus territories. Services within the territories should be provided by a separate network which could also be used by local educational systems.

Channel Characteristics and Sources

The system should consist of at least one audio channel augmented by peripheral devices. The systen is envisioned to be fully interactive with any site being able to originate programmes and discussions. One important characteristic must be capability to allow confidentiality in academic and administrative teleconferences.

The telephone network would consist of leased lines between campus and the international gateway, to ensure high quality. The question of leasing a 24 hour dedicated line versus pre-arranged block times will depend on usage, unit costs, and whether special rates can be negotiated. Leases are in any event terminable on one month's notice.

Peripheral Devices

Some form of video presentation is considered necessary. Facsimile, electrowriters, computer graphics and slow-scan television are attractive possibilities. Audio recording equipment, at least at the Campus centres, should be included in any equipment package.

Supplementary Devices and Materials

An audio network, per se, even if peripherals are extensively used, cannot meet all requirements for the transmission of knowledge without additional components. The most important of these would be the production and distribution of print, audio, and audio-visual materials since it would be foolhardy to expect reasonable levels of success without adequate back-up educational material.

PROGRAMME CONTENT

The programme should be introduced on a phased basis both as regards sites and content. Initial efforts should concentrate on activities which are as far as possible natural outgrowths of present programmes, e.g. distance education and administrative teleconferences, but some experimental services are necessary. The recommended programmes are listed in the order of their expected contributions to the establishment of a permanent operation. The programmes recommended are as follows:

1. Extension Studies (teaching for credit towards a University Degree, Diploma or Certificate)

   Support for Challenge Examination Candidates (for details see Chapter Nine). The Challenge Candidates in this programme would, like part-time students, require a minimum of two years to complete Part I of the degree programme. A phased introduction of the distance programme would therefore be both rational and convenient. Teaching would begin with SY 103, EC 104, EC 105, and MS 106 since these subjects attract the larger number of candidates. In the second year these would be repeated and any or all of the other courses, except perhaps EC 214, could be added. About 150 hours of teleconferencing time are suggested for the first year.

2. Administrative and Academic Teleconferences

   Provided that confidentiality can be ensured, this would be best way of introducing a large number of UWI administrative and academic staff to teleconferencing while improving the efficiency of certain necessary administrative functions.

   Boards/Committees for which some meetings might be teleconferenced and indicative times for the first year of operation are:

1.	Appointments Committee	15 hours
2.	University Selection Boards	40 hours

3.	Faculty Executive Committee	12 hours
4.	Board for Postgraduate Studies	6 hours
5.	Meetings of Teachers in particular subjects	30 hours
6.	Agreeing examination papers	30 hours
7.	Supervising postgraduate students	20 hours
8.	Libraries	20 hours
9.	Inter-campus lectures, demonstrations and experimental teleconferences	20 hours
10.	General facilitation of administration and faculty matters, consultations, etc.	25 hours
	Total	218 hours

3. Extra-Mural Studies (special non-degree courses):

These would be special programmes organised by the Department of Extra-Mural Studies, other departments or faculties, related directly to ecomomic development and social welfare of the territories involved. Initially, it would be prudent to adapt sections of present courses where possible to provide, e.g. in-service training for nurses and other health professionals, training in business, public administrations, accounting, etc.

4. Extension Services (various services not requiring significant structured course work):

The focus here should be on consultations, workshops and seminars on a range of development related topics.

Medical Programmes:

(i) Medical Consultations and Seminars

Some of the Medical Conferences which are now arranged by the Cave Hill Campus should be teleconferenced; and in addition regular medical consultations should be carried out over the full network. Audio tapes of the proceedings should be made available particularly in those territories which are not included in the network. Time slots should be also arranged for about three brief seminars during the first year. Medical conferences might be allotted 10 hours; consultations 20 hours and seminars 5 hours, during the first year.

(ii) Allied Health

The facilities of the network should be made available for UWI/PAHO training programmes for Allied Health Training on an in-service basis. The largest requirement seems to be for public health inspectors. The programme would not initially aim at pvoviding formal qualifications although some form of certification would be useful. The suggested time allocation for this programme is about 20 hours during the first year.

5. Applications in Agriculture

A number of recommendations on the use of teleconferencing in agriculture are in Chapter Nine. The following are selected for an initial programme:

(i) In-Service Education and Training of Extension Workers.

This training would consist of lectures and seminars. About 30 hours could be assigned for these activities.

(ii) Teleconferencing

A series of regional meetings between a variety of officers, e.g. Chief Agriculture Officers and Chief Extension Officers; researchers and other specialists; information and communications personnel is recommended. About 10 hours could be devoted to these during the initial year.

(iii) Information Distribution

Information transfer is said to be one of the most important applications of a teleconferencing network in Agriculture. An allocation of 12 prime time hours during the first year seems adequate. Additional time would be available for "off-peak" hours use.

6. Experimental Communications:

These could include extra-regional communications, data linkages, computer activities, demonstrations and other activities proposed by users or others. In this section trials will also be made of various items of equipment, software, etc. These services will also provide for public relations exercises. Fifty hours would probably be adequate during the first year.

Caribbean Examinations Council Workshops

The Caribbean Examinations Council is anxious to upgrade science teaching in the Region to cope with its new curricula. This would be done by means of workshops some of which would be teleconferenced. This would normally take place during the summer period when there should be little pressure on the network. About 20 hours could be allocated for this purpose.

DURATION AND TIMETABLE

A five year pilot is recommended. This should begin as early as possible. University activities might dominate the academical year with the period mid-July to September concentrating on outreach and other services.

By the end of the third year the level of success of the pilot will be measured by the willingness of the Caribbean governments to inject funding. The fifth year would, if the programme were sucessful, see the conversion to a full operatioal system.

PROJECT MANAGEMENT

GENERAL

1. Project Office: A project office will be established within the office of a Pro-Vice-Chancellor on the Mona Campus.

2. Advisory Committee: An Advisory Committee representing a suitable range of staff of the University will be appointed by the Vice-Chancellor. The functions of the Committee will be: to serve a conduit for information and feedback between the University and the project; to advise on the structure and content of the experimental programmes; to contribute to and review the planning for subsequent operational service.

   The Committee will be chaired by the Pro-Vice-Chancellor within whose office the Project Office is established. It is expected that the following University units would be represented: the Administration of each of the campuses; the Planning Unit, the Extra-Mural Department, the Bursary, and appropriate faculty representation.

3. Interested institutions, including telecommunications administrations, should be invited to participate in certain project activities.

STAFFING

1. Project Director: The Pro-Vice-Chancellor in whose office the project is located would serve as Project Director with responsibilities which include:

- The organisation and operation of the pilot activities including the co-ordination of all technical preparatory requirements (e.g. classroom preparations);

- Direction of, or participation in, as the case may be, various studies which may be conducted during the experimental period, such as evaluation, technical planning for operational delivery systems and the preparations of proposals for the institutionalisation of the efforts within the UWI;

- Investigating on a continuing basis the possibilities within and outside the region for financial support.

- Liaison with governments, telecommunications authorities and donors.

The Project Office should have a number of staff, full time or part time, as conditions merit. These should include:

1) Academic Co-ordinator

The Academic Co-ordinator would be largely responsible for:

i) liaison with the faculties;

ii) focussing on the development of courses and programmes and teaching packages for distance education;

iii) arranging in consultation with the Director and Project Manager for training, seminars, etc.;

iv) the evaluation of University level programmes.

2) Project Manager

The Project Manager will be responsible for the day to day operations of the Pilot, including financial supervision, timetabling, arrangements for training and the production of materials. The Manager would also arrange for demonstrations,

publicity; and keep all the necessary records including evaluations which would be needed for preparing the final report. The development of new programmes particularly in outreach would be another duty. This should be a full time position.

3) Electronics/Communications Technologist

The Technologist will have the main responsibility for:

i) ensuring the proper check out, installation and maintenance of equipment;

ii) dealing with the telecommunications authorities on technical matters;

iii) arranging training and support for technicians on the campuses and non-campus sites;

iv) keeping under review developments in new instrumentation and systems.

4) Other Staff

Secretarial, Technical, Educational Technologist, Graphic Artist, Television and Audio Programme Producers and Technicians will be required. A full time secretary is necessary. For the others the loading would depend on the scale of the programme and the possibility of sharing duties among the various production centres.

Cave Hill Campus

1. Campus Project Co-ordinator

The Project Co-ordinator will be responsible for the co-ordination of the work on the Campus site including as necessary arranging the provision of technical assistance to the non-campus sites. The campus co-ordinator would also be the liaison between the Project Office and the Campus.

The Project Co-ordinator will also liaise with local government and telecommunications authorities as necessary. He will serve on the Advisory Committee and liaise with the Campus academic committees and administration.

2. Technician

The technician would oversee the installation of equipment and carry out or arrange service and maintenance. He

would also manage a spare parts stock and be a resource person for the non-campus sites. He would, for example, travel occasionally to these sites and receive and repair equipment which canot be dealt with there. Though probably attached to one of the Campus Electronic Units, his duties with respect to the project would be clearly spelt out and agreed to provide the project with priority services.

The scale of operations would determine the number of man hours required.

3. Other Staff

Secretarial, graphic artist and technical assistance for audio and audio-visual work would be needed. Again, the scale of the project would determine the number of man hours and this would determine whether full time or part time or shared employment would be desirable.

St. Augustine

The requirements on this campus would be the same as for Cave Hill except that, because of the particular importance of Agriculture, one additional person would be required with specific responsibiity for the agricultural programme.

Non-Campus Sites

1. Site Management and Staff:

Each participating site will have a co-ordination office with one person responsible for site co-ordination. It is assumed that the overall responsibilities will be undertaken by the Resident Tutors or Extra-Mural Tutors for the most part. They may be supplemented by part-time people to handle the extra work load or to add specialised contributions. The need for additional resources would depend on the scale of the pilot and on the staff of other institutions. These needs would have to be worked out on a case by case basis.

2. Technical and Maintenance Staff:

It is expected that technical and maintenance staff will be available at the radio broadcast stations or telephone communications centres in each non-campus site. With the agreement of their employers, these persons would be trained to operate, maintain and repair the equipment and be made available to the project on an on-call basis. During routine operations no more than the equivalent of one technician on a quarter time basis would be needed at each site.

Teaching Staff

It is not envisaged that University academic staff would be employed directly to the project, but a significant additional load would fall on the departments which are particpating fully. This may be dealt with in various ways including:

1. strengthening the department concerned by appointment of full time staff, or part-time staff;

2. provision of funds for honoraria, payment for specific sub-projects, etc.;

3. using specially invited non-UWI staff as appropriate.

PRELIMINARY IMPLEMENTATION PLAN

The programme should ideally begin with an academic year in October, but this is not absolutely necessary. However, about six months of lead time would be useful during which:

1. the academic co-ordinator, campus co-ordinators, site co-ordinators and project manager would be identified, briefed and trained as necessary;

2. contracts would be finalised with the various telecommunications agencies;

3. arrangements would be completed for technical services including audio,audio-visuals and graphics, on the campuses;

4. equipment would be purchased, received, tested and installed;

5. the academic programmes for the first year would be worked out in detail and arrangements made to prepare the necessary back-up material. In this connection, agreement between the staff of the campuses to provide common courses would greatly facilitate the programme;

6. visits would be made to the various territories to:

   (a) brief the relevant Ministries, resident tutors and prospective students;

   (b) finalise the physical arrangements and timetable for distance teaching;

   (c) introduce the question of tuition fees, day release, etc.;

7. identify teaching practice locations, etc.;

8. furnish project offices;

9. draw up timetables for the first year and indicative timetables for the subsequent year;

10. report to faculties, academic boards, etc.;

11. register students.

Table 54 gives a summary of recommended programmes for initial year's operations.

Table 54 : Summary of Recommended Programmes for Initial Year's Operations

Programme	Target Group	Allocation for first year (Hrs).
	EXTENSION STUDIES	
1) First Year Social Sciences	Candidates for Challenge Examinations	150
2) Certificate in Education for Teachers of the Deaf	Teachers in Special Education Schools	100
3) Certificate in Advanced Nursing Education	Nurses in hospital practice	80
	ADMINISTRATIVE AND ACADEMIC TELECONFERENCES	
Meetings of Boards and Committees dealing with academic and other matters	University Administrative and Academic Staff Postgraduate students, etc.	218
	EXTRA-MURAL STUDIES	
1) Training in business, public administration accountancy, etc.	Civil servants, administrators, private sector employees	30
2) Training for	Extension Officers in	

Agricultural Extension Officers	the governments' service	30
	EXTENSION SERVICES	
1) Medical Consultations and Seminars	Medical practitioners in countries served by the network	35
2) Training for Allied Health Workers	Allied Health workers particularly public health inspectors	20
3) Applications in Agriculture	Agricultural Officers Extension Officers Researchers, Marketing personnel, etc.	100
4) CXC Workshops	Science Teachers	40
	EXPERIMENTAL COMMUNICATIONS AND DEMONSTRATIONS	
1) Demonstrations	University staff, Ministries of Education, teachers, professional associations, students, etc.	10
2) Data Linkages	University staff	15
3) Extra-Regional Communications	as for Demonstrations	10
4) Equipment Trials	University staff	15
		765
	Time for testing, course administration, etc.	155
	Add 50 hours for contingencies	50
	Total Hours	970

EDUCATIONAL MATERIALS

The importance of adequate back-up for the distance teaching programmes by means of appropriate educational materials cannot be over-emphasised. Indeed, it is this author's view that in the absence of such material, the pilot would at best be a limited success.

The production centres on the Campuses and the library facilities available to the Non-Campus Countries should, therefore, be strengthened.

At Mona, the resources of the Medical Learning Resources Unit, the Production Centre in Mass Communications, the Radio Education Unit and the School of Education Technology Unit, if co-ordinated would have a powerful contribution to make. There is every reason to expect that other institutions such as the Educational Broadcasting Services in Kingston would be involved in the proposed programmes.

CONCLUSION

Project Satellite and the CARCOST study now completed have had substantial impact on a very wide cross section of persons in the Caribbean. Teachers, students, and many other groups have been introduced to the principles and methods of teleconferencing in development and a great many persons have been able to contribute to the scenario recommended for the next stages. In developing the scenairo due attention has been paid to many possibilities including those discussed in Chapters Nine and Ten. The resulting proposals have the support of Ministers of Agriculture, Education and Health.

Enough funds have been identified to allow a start for the Caribbean programme on a relatively small scale, but once underway, expansion would be relatively simple. Various donors have expressed interest in the proposals for distance teaching so that there is potential for growth as the pilot develops.

The proposed telecommunications distance teaching project offers many benefits. It will *inter alia* introduce educators, politicians, government officials and others to the possibilities of the relevant techniques; it will bring a new focus no the development of educational technologies; it will add new meaning to th concept of regional co-operation and will provide many opportunities for training which might otherwise never exist. Hopefully it will be a move towards education for more persons at lower unit costs.

The author has no doubt that communicatins technologies will eventually revolutionise the delivery of education and other services. The proposed Universiy of the West Indies Distance Teaching Experiment will define the extent to which the Caribbean can benefit from these technologies during the decade of the eighties.

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APPENDIX I

ESTABLISHMENT OF AN OPEN CAMPUS:

The following timetable was suggested;

STAGE 1: to be completed by April 30, 1970.

(a) A Pro-Vice-Chancellor to be assigned the responsibility for planning and administering the establishment of the Open Campus;

(b) Studies for each territory to be done on:

i) Number of qualified students available;

ii) Demand for particular courses;

iii) Accessibility of University Centre or other physical facilities to students;

iv) In consultation with the present University staff conversant with educational technology and extension studies techniques, to suggest how best to offer courses, whether through circuit or summer schools, or correspondence courses; or audio-visual methods; or a combination of these.

STAGE 2: to be completed by July 30, 1970.

a) A decision on the relationship between the UWI and the territorial institution to be made;

b) The appointments of Director and Deputy Directors of Extra-Mural Studies, Director and Deputy Director of Extension Studies, other academic staff as seen necessary at the time, to be effected; and

c) Physical facilities - accommodation, furniture and equipment to be decided upon and provided.

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STAGE 3: to be completed by March 31, 1971.

a) Co-operative links between academic departments and Faculties of the University and the Open Campus to be established;

b) A scheme for utilizing the proposed Audi-Visual Centre and the existing Radio Centre, to be prepared in consultation with those organisations;

c) Library facilities for use in the Open Campus to be established.

STAGE 4: to be completed by June 30, 1971.

a) Academic staff for the circuits, based on the demand of each circuit area, to be appointed;

b) Internal Academic organisation - whether Board of Studies or Academic Boards, or other of the Open Campus to be determined;

c) Syllabuses and regulations, should these be deemed necessary, to be drawn up for consideration by Senate.

STAGE 5: to be completed by September 30, 1971.

Registration of Open Campus students.

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Taken from UWI's Planning Unit Publication - August 1970.